
Computerised Accounting Information Systems: Lessons in State-Owned Enterprise in Developing Economies

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Abstract

Although the public and private sector in both developing and developed economies are arguably equally affected by the advent of the computerised accounting information systems (CAIS), evidence on state-owned enterprise (SOEs) in developing countries is limited. Using an in-depth case study of four Ghanaian SOEs, this study explores the conception, motivation, assessment, benefits and challenges surrounding CAIS in developing countries. The study shows that external (e.g. innovation) and internal (e.g. volume of data) factors, as well as potential benefits (e.g. accuracy) of CAIS contribute to its adoption. The study also observes that integration of the CAIS with other existing information systems is virtually nonexistent to allow sharing of financial information on real time basis. The implications of these findings are discussed in relation to theory, practice and policy, with the aim of contributing towards formalising CAIS in SOEs in developing economies.

Key words: Accounting Information Systems, public sector, developing country, Ghana.

Research Type: Case study

Introduction

As information technologies grow more progressive, the manual accounting systems have become gradually inadequate for decision needs (Brecht and Martin, 1996). Consequently, public and private sector firms in both developing and developed economies view CAIS as a vehicle to ensure effective and efficient information flow in the recording, processing, and analysis of financial data. Effective and efficient information flow enhances managerial decision-making, thereby increasing the firm's ability to achieve corporate and business strategy objectives (Manson, McCartney, and Sherer, 2001). This in turn, may increase the prospects of the firm's survival (Platt and Platt, 2012).

CAIS-related issues research, due to its importance to practice and education (Poston and Grabski, 2000), is well documented in the accounting information systems literature. Chenhall and Morris (1986), for example, examine the impact of contextual variables such as structure, environment, and interdependence on CAIS design and performance. Brecht and Martin (1996) explore opportunities for accountants to contribute to systems design. Poston and Grabski's (2000) survey focuses on the underlying theory motivating the research and predicted that future CAIS research would maintain a balance between normative and positive work with organisational theory. Subsequently, research considers use of accounting information by operations managers (Van der Veecken and Wouters, 2002) and enterprise resource planning system and management accounting change (Scapens and Jazayeri, 2003). Likewise, Arnold, Clark, Collier, Leech and Sutton (2006) examine the effects of knowledge-based systems on decision-making and find that the availability of a fully functional explanation facility influence both novices' and experts' judgments. Dehning, Pfeiffer and Richardson (2006) also consider analysts' forecasts and investments in information technology (IT) using a dataset of over 1,000 US firms, thus emphasizing that IT spending increases earnings forecasts, dispersion and error. Ferguson and Seow's (2011) review confirms the continuing decline in analytical and model-building research in accounting information system related research, resulting in research that considers accounting information and managerial work (Hall, 2010) and the utilization of generalised audit software by small-medium-sized audit firms in the UK (Ahmi and Kent, 2013).

Research on CAIS in developing economies is at its infancy, for example, practices among SMEs (e.g. Amidu, Effah and Abor, 2011), threats to security (Abu-Musa, 2006a; b), implica-

tions for internal auditing (Abu-Musa, 2008), failure, success and local improvisation (Heeks, 2002). Evidence on CAIS-related issues in SOEs in developing countries, however, remains scant, despite the notion that public and private sector in both developing and developed countries are equally affected by the advent of the CAIS. This study attempts to fill this gap.

The study contributes to the accounting and information systems by providing empirical evidence on CAIS-related issues from SOEs in developing countries. Specifically, this study presents the results of analysis of four case studies in Ghanaian SOEs that emerges out of their CAIS by answering five main research questions (RQ):

- RQ 1 – What are the conceptions of CAIS by SOEs?
- RQ 2 – What factors motivate the implementation of CAIS in SOEs?
- RQ 3 – How do SOEs assess their CAIS?
- RQ 4 – What are the benefits of CAIS application to SOEs?
- RQ 5 – What are the challenges faced by SOEs in applying CAIS?

This paper proceeds as follows. Section 2 reviews the extant literature on CAIS. Section 3 describes the methodology. Section 4 reports the results of the content analysis. Section 5 presents the discussion. Section 6 concludes.

Literature Review

CAIS denotes an electronic-based system that processes economic information and supports decision tasks in the context of financial management and control of firm activities (Nicolaou, 2000). Borrowing from Rogers' conceptual framework (1995), the rate of adoption of CAIS is determined by five attributes: (1) relative advantage, (2) compatibility, (3) complexity, (4) trialability, and (5) observability. For example, CAIS that enhances planning and evaluation of the firm's financial position and performance by processing economic data in a more reliable, relevant, understandable and comparable form to both internal and external stakeholders (Romney, Steinbart and Cushing, 1997; Wood and Sangster, 2008) are more likely to be adopted and implemented by firms. Research suggests that CAIS promotes cost-effectiveness (Brynjolfsson et al, 2003), ease of sharing knowledge, thereby improving operations (Romney, and Steinbart, 2009) and managers' decision-making processes (Sajady, Dastgir and Nejad, 2012).

Otley (1980) contends that CAIS should be evaluated from three key dimensions: managerial, organisational and environmental context, implying that the efficacy of CAIS depends on both its aims and contingency factors of each firm (Sajady et al, 2012). From this point, assessment is based on users' satisfaction (Corner, 1989), systems' reliability (Flynn, 1992), quality and improvement of task (Gelinias, Oram and Wriggins 1990). Sajady et al (2012), however, find no evidence to support the notion that implementation of CAIS is linked to enhance evaluation processes.

Another stream of research suggests a fit between factors such as technology, environment, and organisational as well as social and ethical, required to promote the initiation, adoption and effective implementation of CAIS (see Ginzberg, 1980; Markus and Pfeffer, 1983; Stefanou, 2006). Nicolaou (2000) confirms this notion, emphasising that the system fit explains the decision makers' perceived satisfaction with the accuracy and monitoring effectiveness of output information. In contrast, Nicolaou (2000) finds that the effect of system fit on decision makers' satisfaction with the perceived quality of information content in system outputs is marginally significant. Indicating that, the 'compatibility with organisational and

professional norms, values, and ways of working' is paramount to perceived CAIS effectiveness (Greenhalgh, Robert, Macfarlane, Bate and Kyriakidou, 2004).

Similarly, at the developmental stage of the CAIS, the firm's decision makers consider the choice between custom-built or off the shelf alternatives. Here, decision makers, due in part to skills and practical experience (Plsek, 2003), are more likely to adopt user friendly CAIS (Denis, Hébert, Langley, Lozeau, and Trottier, 2002). In addition, to inspire participation and overcome real-world hitches, decision makers' choice must aimed at: (1) "system design for, by and with users" (Brief, Schneider and Ciborra, 1983), (2) improving the quality of work life of staff, (3) adopting technically efficient and job satisfaction systems, and (4) making efficient use of resources (Mumford, 1983; Hirschheim, and Klein, 1994).

Another issue worth addressing at the developmental and implementation stages is information security. Information security threats include forced entry into computer rooms, destruction by fire and natural disasters, unauthorised access, disclosure, and modification or destruction of accounting data (Loch, Carr, & Warkentin, 1992). Abu-Musa (2006a; b) finds that entry of inaccurate data, destruction of reliable data, introduction of computer viruses to the system, employees' sharing of passwords, and misdirecting prints and distributing information to unauthorised people are the most significant perceived security threats to CAIS in both the Egyptian banking industry and Saudi firms. Romney et al (2009) also find that natural and political disaster, software errors and equipment malfunctions are major challenges to CAIS. Hood and Yang (1998) also emphasise malicious attack from outsiders as the most important security threat in the Chinese banking sector. Dhillon (1999), however, suggests that threats are caused by insiders especially when it blends with legitimate transactions, implying that firm's employees pose the most serious risk to security (Green, 2003; Swann, 2004; Abu-Musa, 2004).

The impact of the occurrence of these events ranges from disrupted operations to fiduciary losses and failure (Loch et al, 1992; Abu-Musa, 2004; 2006b). Consequently, firms create, maintain and update security solutions such as firewalls, encryption techniques, access control mechanisms and intrusion detection systems to combat security breaches (Katz 2000; Gordon, Loeb and Lucyshyn, 2003). These security measures, in turn, enhance the quality of the CAIS, thus producing relevant, reliable and useful financial and managerial accounting reports for decision-making. Research, however, suggests that many corporations in the US adopted computer technology before implementing appropriate safeguards (see White and Pearson, 2001).

Heeks (2002) proposes a model to understand failures of information systems (IS) by firms in developing countries. The model offers both country context and hard-soft gaps as significant risk to IS failure. Local conditions in developing countries are neglected in the design of IS, implying a considerable design-actuality gap. As well, the "hard" rational design and "soft" political actualities may differ on key dimensions: information, technology, processes, objectives, staffing, management systems and other resources. These gaps, in turn, may result in IS failure.

There is also a growing body of literature suggesting that accounting controls systems in SOEs in developing countries, including Ghana, are ineffective due to political and trade union leaders interventions (see Uddin and Hopper, 2001; Rahaman, Lawrence and Roper, 2004; Uddin and Tsamenyi, 2005). This, in turn, results in misappropriation of funds by top

management (Amankwah-Amoah and Debrah, 2010), poor performance (Adda, 1992), high profile Ghanaian SOEs failures including State Housing Corporations (see Appiah, 2011) and huge public sector deficits (World Bank, 1995b). The huge public sector deficit, in particular, impedes the economic development of Ghana (World Bank, 1995b). This said, Ghanaian SOEs contribute 87.3%, 93.7% and 86% to the mining sector, employment in utilities and total registered employment (Appiah-Kubi, 2001) respectively.

Accordingly, Ghanaian SOEs have benefited from a series of World Bank/IMF led economic reforms aimed at promoting accountability through cost-effective operations (Tsamenyi, Onumah, Tetteh-Kumah, 2010). Specifically, the Provisional National Defence Council (PNDC) government pursued structural adjustment policies including privatisation and reforms, under the auspices of the IMF and World Bank (Uddin and Tsamenyi, 2005). The reforms, in particular, sought to strengthen accountability and transparency issues. For this reason, restructuring funds were made available to Ghanaian SOEs to acquire computer hardware and software, including CAIS, to improve their management and accounting information systems (Appiah-Kubi, 2001). Appendix 1 provides a timeline of significant events leading to the initiation, adoption and implementation of CAIS in Ghanaian SOEs. As well, the State Enterprises Commission (SEC) compelled selected SOEs to submit reports such as annual budget and audited annual reports in accordance with the Companies Code 1963 (see SEC Act, 1987 section 15). Put differently, the SEC intensified monitoring of overall performance of SOEs by introducing performance contracts such as a performance information system, a performance evaluation and monitoring system as well as a performance incentive system (Uddin and Tsamenyi, 2005). This intensified monitoring, in particular, encourages SOEs to make innovative application of management tools ranging from performance contracting to accountability, including CAIS (Appiah-Kubi, 2001).

Research findings, however, are mixed. Here, studies show that structural adjustment programmes including international accounting practices adoption (Uddin and Hopper, 2003) may not enhance financial management controls of SOEs in developing countries (Uddin and Hopper, 2003; Uddin and Tsamenyi, 2005). Tsamenyi, Onumah, and Tetteh-Kumah (2010), however, show that overall performance of Ghanaian SOEs improved after privatisation. They also find that overall performance improvements were associated with key organisational changes (including accounting and control system). Little, however, is known on CAIS in SOEs in developing countries, especially in Ghana (see Uddin, and Tsamenyi, 2005). Thus, the academic literature reveals the need to undertake more-in-depth field studies in order to discover the conception, motivation, assessment, benefits and challenges surrounding CAIS in SOEs in developing countries. More importantly, CAIS issues from SOEs in developing countries may provide fertile ground to analyse the complex interplay of action and context that underlies organisational change (Heeks, 2002). This in turn, may contribute towards formalising CAIS in SOE in developing countries, indicating that CAIS research be extended to SOEs in developing countries, but not restricted to the private sector in both developing and developed countries.

Methodology

This study explores the CAIS approach from the SOEs' perspective. This methodological ontology is appropriate due to our quest to provide an analysis of the context and process involved in the phenomena of study (Hartley, 2004; Robson, 2002). We use case study as a strategy to achieve our goal. Yin (2003) notes the case study involves an empirical investigation of a particular contemporary phenomenon within its real life context using multiple

sources of evidence. In addition, the nature of our study requires an appropriate research strategy to provide insight into how and why on issues surrounding CAIS. Thus, we invoke Yin's (2003) notion that case studies are preferred, when how and why questions are being posed.

Four SOEs of similar size and age are selected for the study. For anonymity, the companies are hypothetically referred to as AC, BC, CC and DC Ltd. These companies, respectively, represent four key sectors: financials, utilities, health care and education. This implies that our sample SOEs fall under the ministries of Finance and Economic Planning, Energy, Health and Education, indicating that certain differences may exist in the information contained in the input and output of CAIS due in part to diverse users and information needs. Thus, we invoke Sanders, Lewis and Thornhill's (2007) notion that qualitative data is highly valuable when derived from different sources. AC Ltd is a service company which was partially privatised in the mid-1990s and then fully privatised under the large strategy group in late 2000s. AC and BC Ltd are non-subvented SOEs with government ownership of 40% and 100%, respectively. CC and DC Ltd, however, are sub-vented SOEs with 100% ownership by the government of Ghana. Thus, the staff costs of CC and DC Ltd are funded by the government but not AC and BC Ltd. This said, the state is responsible for capital projects of both sub-vented and non sub-vented SOEs. BC Ltd is a utility service provider which became a limited company under the large strategy group in the late 1990s. BC Ltd employs around 5000 people. CC Ltd is a health service provider with 5000 employees. AC and BC Ltd also dominate their respective industries with market share of 25% and 100%, respectively. In addition, CC and DC Ltd are also ranked as the second-largest in their respective industries.

An interview guide (see appendix 2) is designed on the five thematic areas of the study to gather data from four main actors of the four SOEs. In detail, we interview sixteen respondents in various roles within the accounting and IT divisions. The interview is conducted on one-on-one basis by meeting the respondents face-to-face. The method offers adequate time with the interviewees to probe further into issues and thus, gain insightful information.

Finally, due to the research ontology (qualitative) as well as the methodology (personal interview using an open questionnaire), no attempt is made to quantify the data. Accordingly, content analysis is employed as the main tool of analysis. Precisely, we systematically analyse responses based on the five thematic issues of the study (see Yin 2003) and present our analysis in the form of descriptive analysis, in the next section.

Data Analysis

This section is logically structured under five thematic areas namely: (1) conception, (2) motivation, (3) assessment, (4) benefits and (5) challenges. Specifically, we highlight on empirical findings based on the interview and subsequent content analysis.

Conception of CAIS by SOEs

It is established that there is a relationship between the practical and theoretical definition of CAIS due in part to the definitions of the subject matter as given by the respondents. In respect to the inputs to the system, the analysis indicates that the business lines determine its inputs, whereas financial statement reports remain a core of the output of the CAIS. The subsequent paragraph discusses each concept in turn.

Definition of CAIS in SOEs

Respondents define the term “CAIS” in their own words. Similar answers are obtained, each dwelling on the components and processes of information systems. The emerging definition is that, CAIS is the use of computer as a tool to perform the book-keeping and accountancy duties.

For instance, an interviewee of DC Ltd defines CAIS as “a system which helps to process accounting data to enable us come out with information needed by users”. More specifically, an interviewee of BC Ltd states that “CAIS involves all that is done in the accounting section that is, processing data into information to aid in decision making”. The interviewees of AC Ltd describe CAIS as a system that processes accounting data into information. An interviewee of DC Ltd outlines that “CAIS signifies the use of computers or equipment to transform economic data to facilitate decision making and control”. The respondent, however, cautions that, “CAIS should be efficient, user friendly and provide detailed report”. This definition captures all of the key terms in the CAIS definition save data storage. This could be attributed to the fact that the respondent is a chartered accountant and holds a masters qualification.

Constituent or component of CAIS in SOEs

Our case study companies have made a great effort towards automating most of their accounting activities. There are, however, considerable activities performed manually. The respondents observe that, in spite of the perceived benefits of automation, certain aspects of their record keeping are still done manually; either because of statutory requirements or done manually and later captured into the system. The central emerging theme is that, “automation is an on-going process”, suggesting that our case study firms are yet to attain full automation. For instance, authorisation of both bank and stock balances reconciliations, as well as the preparation of receipts are carried out manually in all the four SOEs.

The authorisation and preparation of documents within Ghanaian SOEs are governed by statutory provisions such as The Financial Administration Regulation 2004, The Financial Administration Act, 2003, The Internal Audit Agency Act, 2003 and The Public Procurement Act, 2003. Further, these documents are reproduced into internal control manuals to facilitate compliance. These internal control manuals, in turn, require certain aspects in the accounting information system to remain manual. The present finding echoes Romney and Steinbart’s (2009) notion that the processing of accounting data could be manually or computerised.

Another discovery worth mentioning is on the preparation of payment vouchers. This activity is carried out manually in both BC and CC Ltd but not in AC and DC Ltd. AC and DC’s respondents observe that the highly competitive nature of their respective sectors; financials and education, in part explain the automation of payment vouchers. In addition, the respondents in AC Ltd emphasise that automation, especially on preparation of payment vouchers, improves the firm’s claims paying ability and protection factors. The volume of preparation of payment vouchers in BC and CC Ltd, however, is marginal relative to AC and DC Ltd. Specifically, BC and CC Ltd, due to the nature of their businesses; utility and health care providers, engage either in ‘single-source’ and/or ‘where price is not a factor’ procurement procedures. These procedures, in turn, require board’s approval of relevant documents among others (see The Public Procurement Act, 2003: sections 39-40; 75). The

board's approval is contained in board minutes, which is confidential to the board and the executives, and thus, practically not feasible to be automated.

Major inputs and outputs of the CAIS in SOEs

In AC Ltd, the system needs to be fed with information ranging from value to the seating capacity of a vehicle to enable the processing of customer bills as an output. At BC Ltd, however, the process requires information such as the type of customer and/or units of service consumed during the period under consideration as the only necessary input to produce a customer bill. This confirms Romney and Steinbart's (2009) assertion that inputs and outputs of a CAIS vary from one company to another, due in part to dissimilar business activities. From this point, BC (utility) and CC (health service providers) Ltd use the same accounting package (i.e. Sun Business System), but input and output differ. Here, BC and CC Ltd report to the Energy and Health Ministries, respectively. Also, different CAIS systems are used by CC and DC Ltd, despite the fact that their activities in relation to accounting and finance are similar, predominantly receipt and payment.

Users of the Output of the CAIS in SOEs

The analysis reveals two distinct groups of users of the output of the CAIS, namely internal and external users, the analysis of which we turn to.

Internal users: Users of the computerised system are identified to be executive management and staff within accounts and finance departments. To ensure control and reliability of accounting information, access to CAIS is limited to key staff of the accounts and finance department. As well, restriction is placed on the kind of information the staff can access through the use of passwords. This is referred to as authentication and authorisation controls (Romney and Steinbart, 2009). The respondents observe that CAIS aids internal decision making by providing discretionary information, including detailed analysis of receipts, payments, accounts payables, accounts receivables, cash management, petty-cash utilisation, and stock balances.

External users: The results suggest that CAIS adoption has enhanced the financial reporting process by providing timely mandatory reports to external users in all four firms. Respondents in AC, for example, claim that CAIS strengthens the quality of financial reports and, in this mode, guarantees compliance with the Ghana Companies Code 1963 (Act 179) and Insurance Act 2006 (Act 724). In this respect, the Ghana Companies Code 1963 (Act 179) requires directors of private companies limited by shares to prepare annual financial statements which give a true and fair view of the state of affairs of the company. BC, CC and DC Ltd, however, are limited by guarantee, implying that they are not supposed to comply with section 42 of the Companies Code 1963. This said, BC, CC, DC are required to submit prescribed accounts to their respective ministries. DC Ltd, for example, is mandated to prepare and submit its annual financial report to regulatory bodies including The Controller and Accountant General, The National Council for Tertiary Education, The Auditor-General and Ghana Education Service. The respondents from DC Ltd echo that, the application of CAIS improves data processing. The present findings confirm Romney and Steinbart's (2009) notion, suggesting that application of CAIS provides timely and useful information to external users.

Motivation of CAIS in SOEs

With the exception of DC Ltd, the four public companies have adopted CAIS for not more than ten years, though the revolution in IT started about three decades ago. AC Ltd initiated CAIS in the year 2000; whereas both BC and CC Ltd initiated CAIS in the year 2004. The interviewees of DC Ltd, however, fail to provide a definite date, due to lack of proper documentation on their CAIS's history.

We find that the most pressing motivation for CAIS is an increasing workload. An interviewee at AC Ltd, for example, emphasizes the fact that “they can no longer rely on manual accounting system, due to the fact that they are market leaders, which in turn, increases the volume of financial data and information they handle”. The important implication is that CAIS solves this problem to some extent. The selected SOEs, however, are reluctant to make improvements to the system, due to budgetary constraints.

In addition, the motivation themes that emerged from the content analysis include factors such as: the size of the business and its information-density, competition and external agents, computer self-efficacy of decision maker, level of IT expertise, qualifications, and technological innovation. It is worth noting that an interviewee at BC explains that “application of computers in accounting was championed by a former sectional manager who had an IT background”. On the other hand, an interviewee in CC Ltd points out that “efficiency in processing financial data, the need to reduce cost and increasing numbers of patients were the main motivating factors which called for accounts computerisation”.

We enquire about the motivation behind the shift to CAIS at the DC Ltd, an interviewee posits that, “Keeping and preparing financial data manually takes much time and it is susceptible to human error. More importantly, computerisation is definitely the way forward given the increasing volume of financial data that is handled on a day to day basis. Finally, as public institution, we are required by statute to prepare and submit financial report to a number of regulatory bodies. Obviously, at this technological age, a manual report is not acceptable”. These findings cement Thong's (1999) claim that an entity's characteristics such as organisational decision makers, technological innovation, organisation and environment, impact positively on the decision to adopt CAIS.

Assessment of CAIS by State-owned Companies

On assessment, AC Ltd is outstanding, in part due to the fact that it has changed its software twice and is planning to change the software for the third time. Respondents observe these changes were motivated by severe competition, which necessitated an innovative response including increasing user access to strengthen the firm's dominance in its industry. This denotes that the best way to assess a system is to compare it with previous systems or a competitors' system. In addition, all of the firms suggest that CAIS enhances employee efficiency and effectiveness.

AC Ltd: The interviewees posit that CAIS helps the company to deliver efficiently and effectively. The feeling of work being made easier for its workers and the fast delivery of services to its clients makes CAIS effective for them, as it provides a chunk of the requirements of the system's users. Another interviewee of AC Ltd also measures the efficiency and effectiveness of the organisation's CAIS by the speed at which claims and registrations of clients are processed. Further, the analysis reveals that AC Ltd's internal control system (example: user passwords and limits) are adequate to check abuse, implying that their CAIS promote

quality information for decision making.

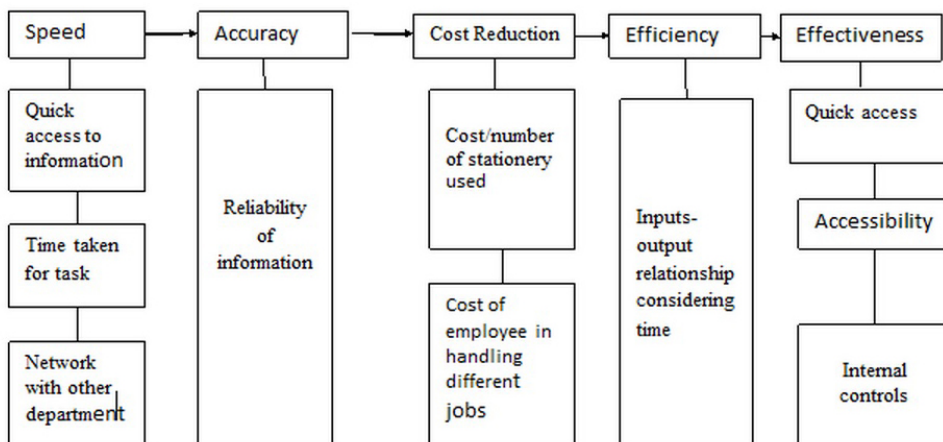
BC Ltd: An interviewee explains that the main basis of assessment of their system is by its output and the speed at which it produces various report. He explains that, “at any point in time, it is possible to generate any type of report; like the variance report, stock balance report among others”. Another interviewee also affirms that their system meets users’ expectations and, in this light, concludes that their system is functionally well. He, however, adds that much could be achieved without the restriction on the number of users at a time (eight users at a time).

CC Ltd: An interviewee explains efficiency as “being able to get through work with less time and labour”. He reiterates that the efficiency of their system is measured based on timely information for decision making, the speed with which work can be done and cost reduction achieved. He concludes that CAIS is better, compared with manual systems. An interviewee at CC Ltd adds that “financial decisions making has never been easy with the manual system of accounting. At any point in time, management is better informed on the financial position of the organisation with CAIS”. The respondent, however, contends that no system is totally perfect and that access is a one of the limitations of their CAIS.

DD Ltd: The CAIS is assessed by the input – output relationship, time spent in processing and actual or departmental expectations. In line with this basis of assessment, an interviewee defines the effectiveness of a system as performance equals expectation, whereas efficiency is the input-output relationship considering time. Here, his definition focuses on speed (time being a factor) and cost reduction (input-output relationship). Though the respondent and other staff are not conversant with their CAIS, they believe that the system is efficient and effective. The interviewee, however, suggests that the system should be user friendly and should be networked with other departments for the sharing of data and information.

In conclusion, the assessment by the four companies of their CAIS is based on speed, accuracy, cost reduction, efficiency and effectiveness of the systems as depicted in the framework in Figure 1 below.

Figure 1 - A proposed integrative framework of assessment criteria in state organisations in developing countries



Benefits of CAIS in SOEs

The benefits of CAIS to the SOEs include, but not are limited to, increased speed and accuracy, improvement in the work life of employees, effective supervision and improved decision making processes. From the interview with the main actors of DC Ltd, we realise that one major benefit of the introduction of CAIS is that it has reduced human errors and thus increased the reliability of information. This supports Wood and Sangster's (2008) assertion that speed and accuracy, error detection and reporting enhancement are some of the benefits of CAIS. Further, the processing of data is very fast in all the cases. The output, however, is based on the accuracy of the input, hence the term "garbage in garbage out".

CAIS also improves the work life of employees. Actually, all the sixteen main actors mention that introduction of CAIS has made the work life of employees comfortable. Respondents suggest that issues such as closing balances are extracted from the system and submitted to management, which enable them to close from work on time. It has also improved decision making and communication in the organisation, due in part to its speed and accuracy when generating reports. McMahon (2001) notes that, financial accounting has remained the principal source of information for internal management in organisations as accounting is a means of measuring the value of any economic activity, is relevant here. Also, the introduction of CAIS has improved the level of supervision, due in part to superiors' access to data input of subordinates.

Challenges of CAIS Application to Public Companies

We identify organisation's own employees as a major threat to CAIS. This verifies Green (2003) and Swann (2004) Abu-Musa's (2004) findings, suggesting that organisation's own employees are potentially its own worst enemies. As an interviewee of BC Ltd notes, "the system is made and managed by humans, hence problems are inevitable". The challenges put forth by AC Ltd invoke Dhillon's (1999) assertion that threats such as backdating which are mainly internal are caused by employees, perhaps the greatest challenge to entities within its industry. The analysis reveals that inadequate knowledge of IT of most staff is also a challenge leading to unintentional errors.

Another challenge put forth by AC Ltd is the inability of the system to match results from two systems, though there is an interface. At BC and CD Ltd, system malfunctions and software errors are identified as major challenges. This can be attributed to the fact that both BC and CC Ltd use the same software. Further, the software of DC is designed to suit its accounting department needs, but not free from challenges. These challenges include power surging, password restriction and disjointed networks.

In sum, the major challenges are mainly internal to the organisation. In particular, employees and system malfunctions are identified as the two most important challenges. Other challenges (example: natural and political disaster, undetected data transmission errors) and intentional acts are not mentioned in the responses. This might be attributed to the sensitive nature of these issues in the state organisation settings.

Discussion

The aims of this section are three fold. One; we present the implications of our findings to theory, practice, and policy. Two; we outline the limitations of the study; and finally; we

highlight fruitful research directions. We explain these in detailed in the subsequent paragraphs.

Implication for theory

Our primary contribution comes from exploring the practical approach of CAIS and SOEs in developing countries. The contribution of this paper is three fold. First, the focus on an important but neglected subject of CAIS of SOEs in developing countries. Thus, we depart from the paradigm of focusing on private owned entities in developed economies which has dominated the extant literature.

Second, the study bridges the gap in accounting information system literature by proposing two distinctive models on CAIS assessment and application from SOEs in developing countries perspective. Specifically, we highlight on external and internal as well as benefits as the main drivers to acquire, maintain and update CAIS in SOEs. In addition, we provide a benchmark for assessment of CAIS in developing countries.

Finally, our findings on teething problems of CAIS are not different from prior studies conducted in developed and less developed economies, despite the fact that we focus on SOEs. Thus, we have empirical evidence from the developing countries perspective to support prior studies (e.g. Dhillon, 1999; Wood and Sangster, 2008).

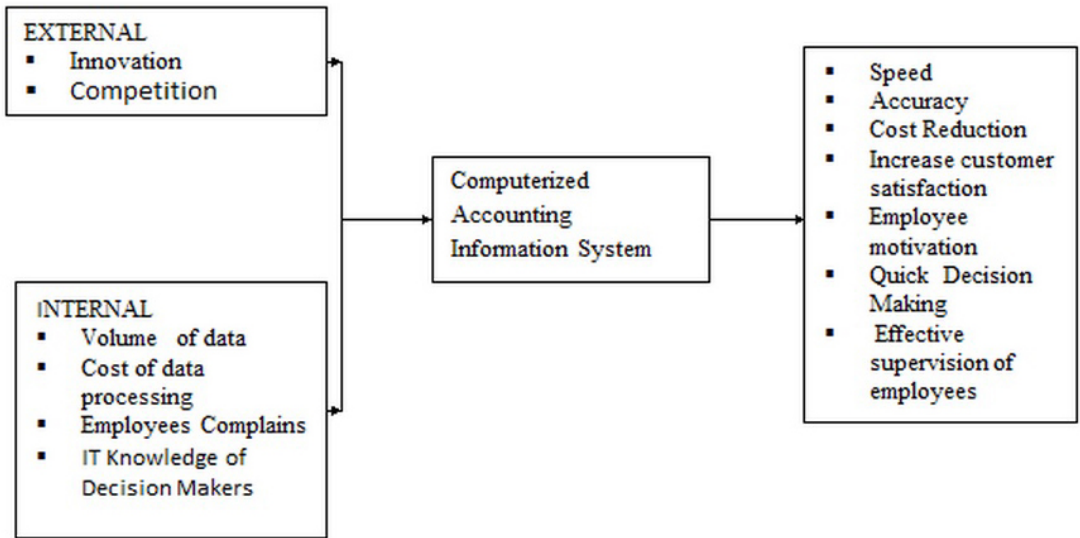
Implications for Practice

The findings of the study provide several implications for practicing managers. First, innovation and competition from the external environment cannot be overlooked in decision making in terms of CAIS adoption. This implies that managers must periodically scan their external environment to ensure that they keep up to date in terms of CAIS, which in turn, may lead to a strategic competitive advantage.

Two, internal appraisal of the volume of data, cost of processing data and employees complaints must be done periodically to ascertain strengths and weaknesses of existing CAIS. This appraisal must be evaluated vis-à-vis the benefits of the present CAIS to identify staff training needs and/or system upgrade.

Three, our results indicate that the benefits of CAIS include speed, accuracy, cost reduction, increase customer satisfaction and employee motivation (see Figure 2 below). Top officials of SOEs in developing countries are well advised to develop better performance assessment scorecards of employees and systems on the thematic areas identified in the responsive model of CAIS in Figure 2. In addition, we believe that the scorecard can improve planning and control, which in turn, will impact positively on a firm's performance.

Figure 2 - Responsive model to CAIS application in state organisations in developing countries



Four, virus attacks cause systems to be slow, unstable and lose files. This problem is identified as one of the major challenges facing SOEs' CAIS. It is therefore recommended that SOEs should purchase and install potent anti-virus programmes to enable them to protect their CAIS and data from virus attacks. Further, external back-up of files is highly recommended.

Implications for policy

Some of the challenges identified are human-related. They include lack of or inadequate knowledge in IT, unwillingness to adapt to innovation and resistance to change. It is therefore suggested that IT knowledge should be considered a prerequisite skill in future appointments.

In as much as there is the need to adopt CAIS, there is also the need to ensure that personnel possess the needed skills to embrace the new technology. CAIS should be user friendly to ensure efficient and effective use, so as to reduce unintentional risk on the part of personnel. This can be achieved by conducting regular workshops and presentations with users of the CAIS to assess how comfortable they are with the system.

Financial information processed by the four cases of the study is voluminous, implying that the impact of finance is critical for decision making. However, integration of the CAIS with other existing information systems is virtually non-existent in these SOEs to allow sharing of financial information on a real time basis. Financial information generated by the systems is used by staff within the accounts office only. To encourage closer integration with other systems, intranet application is recommended for consideration.

Three of the selected companies are still using the first accounting software adopted from the CAIS migration. There has not been any improvement in software, though there are inherent limitations. There is the need for companies to upgrade the systems or replace them

with better ones which meet current needs.

Limitations and Future Research

There are several limitations inherent in the qualitative and, in particular, the interview approach adopted. First, the study is based on four SOEs in a non-experimental setting, hence limiting the generalisation of our findings. Therefore, future research using a larger sample to provide a better insight is desirable.

The second limitation relates to the culture in SOEs in Ghana, which might have affected responses from respondents. Here, information disclosure is seen as a taboo, making it difficult for us to cross interview junior staff within the Accounting and Finance Departments of the four SOEs despite our promise of anonymity to participating firms and participants. In sum, factors like the sample size, subjectivity of respondents and inability to authenticate the primary data by having a second interview with the respondents certainly limit the ability to generalise the findings.

Smith (1991) points out some other considerations that we should be aware of, such as reliance on self-reporting by respondents with no reliability testing, opportunity for misinterpretation by researchers and, at least to a certain degree, analysis on perceptions instead of on behaviours. However, these limitations do not affect the validity of the study, due to the purpose of the study (i.e., to learn about SOEs' CAIS from their own perspective, leaving aside for a moment the existing literature).

Therefore, future research can consider replication from the perspective of junior staff. Also, the culture, processes and mission of SOEs differ from the privately owned firms, which imply that our models might not be applicable to the private sector. Hence, future research can consider a comparison between the SOEs and privately owned firms in developing countries to establish the findings' generality. Finally, future researchers must consider cause-effect relationships between different variables in CAIS adoption. We argue that these are fruitful lines of research to deepen our understanding of the specific approaches to CAIS and SOEs.

Conclusion

The spirit of this study is discovery. The objective is to fill the existing gap in literature on diffuse literature on CAIS and SOEs from the developing countries perspective. To achieve our objective (1) we carry out an in-depth interview with sixteen main actors of four large Ghanaian SOEs, and (2) develop two frameworks, namely (1) CAIS assessment in SOEs, and (2) CAIS application in developing countries. The content analysis depicts that external factors such as technological innovations and impact of competition combined with internal factors such as volume of data, increased cost of processing data, employees complaints and IT knowledge of decision makers as well as the benefits of CAIS, leads to adoption of CAIS. The benefits of CAIS include but are not limited to speed, accuracy, efficiency, effectiveness and customer satisfaction. In addition, there are strong links between employees and challenges in the CAIS. Hence, top management controls the human errors by limiting access to information.

With respect to public companies conceptions of CAIS, it is observed that the definition of CAIS and the activities engaged in by SOEs are in line with the definitions and activities as

proposed in the extant literature. The efficiency and effectiveness of a CAIS are measured using the basic functions of information systems such as accuracy, reliability and timely information to stakeholders.

Some of the challenges associated with CAIS are high initial cost of investment, high cost of training, security and control of valuable information, power failures and the issue of virus attacks on the systems. Here, certain challenges are identified to be inimical to maximising the full potential of CAIS.

The findings, conclusion and recommendations of this study is based on the analysis of data gathered from personal interviews conducted with the main actors of CAIS in each of the selected companies, focusing on the factors that motivated the implementation of their CAIS, how the companies assess their CAIS, the benefits of CAIS, and challenges of CAIS to the companies. The consequences of our findings are discussed in relation to theory, practice and policy, with the goal of contributing towards formalising CAIS in SOEs in developing countries; this makes this study remarkable.

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Appendix One

Public Sector reforms' History (Demonstrating Outstanding Events in the initiation, adoption and implementation of CAIS in Ghanaian SOEs)

Pre-Independence to 1960

The colonial government established SOEs to provide Socioeconomic services in urban centers (Appiah-Kubi, 2001)

The public sector contributed 55.3 per cent to total formal employment

1957 to 1965

The Conventions People's Party (CPP) regime of Dr Kwame Nkrumah, the first government post-independence, had robust political affiliation with the Communist Soviet Union and, in this mode, promoted Socialism ideology (Killick, 1978).

Dr Kwame Nkrumah promoted economic self-sufficiency through rapid expansion of SOEs and rapid industrialisation (The Economist Intelligence Unit, 2002)

In 1965, the public sector's contribution to total formal employment increased by 14.9 to 70.2 per cent (Boateng, 1997)

In 1966, the number of SOE increased from four at 1957 to over 53 (Killick, 1978), increasing its employment from 11,052 to 115,826 (Adda, 1992)

1966 to 1969

On 24th February 1966, the CPP government, due to its alliance with the Soviet Union, was removed through a coup d'état led by Col E. K. Kotoka, Major A.A. Afrifa and Inspector General of Police J.W.K. Harley and backed by US Central Intelligence

In 1966, the military government led by General Joseph Ankrah of the National Liberation Council (NLC) attempted to overhaul Ghanaian SOEs (Appiah-Kubi, 2001) by promoting economic policies ranging from privatisation to restructuring (Boateng, 1997) .

In 1969, the NLC government was forced to resign due to a bribery scandal

1969 to 1972

In 1969, the civilian government led by Dr Kofi Abrefa Busia of the Progress Party (PP) adopted a liberalised economic system and thus, sustained the NLC's anti-Nkrumah Ideology (Boateng, 1997).

In 1971, there was a 44 per cent devaluation of the Ghanaian cedi, resulting in a lot of resistance from the public.

1972 to 1978

In 13th January 1972, the army led by Colonel Ignatius Kutu Acheampong removed the PP government.

The Acheampong government is recognised for its quasi-Socialist policy and non-compliance with the IMF and World Bank policies (The Economist Intelligence Unit, 2002)

In 1978, the public sector's contribution to total formal employment increased by 16.2 to 86.4 per cent (Boateng, 1997)

1978 to 1981

Political instability, due to the military coups by General F.W.K Akuffo on 5 July, 1978 and Flt Lt J.J. Rawlings on both 4 June 1979 and 31 December 1981, however, interrupted SOEs reform by the Acheampong and Dr Hilla Limann governments (see Amankwah-Amoah and Debrah, 2010)

In contrast, the Armed Forces Revolutionary Council (AFRC) regime led by Flt Lt J.J. Rawlings seized the assets of a number of manufacturing firms, including United Soaps Industries, and thus, added to SOEs (Appiah-Kubi, 2001)

1982 to 1983

In the 1980, severe drought and a substantial fall in export revenues hindered the Provisional National Defence Council (PNDC) government's Socialist policies.

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The PNDC government, in turn, sought aid from IMF and the World Bank. As expected the IMF and the World Bank attached conditions including the introduction of the structural adjustment policies such as privatisation and reforms. (Uddin and Tsamenyi, 2005).

In 1987, the number of SOEs was around 324 (World Bank 1995c), accounting for around 36 and 86 per cent of the overall GDP and formal employment (Killick, 1978; Appiah-Kubi, 2001).

This notwithstanding, SOEs exhibited poor financial performance due to lack of managerial and technical competence, corruption, political interference, and indebtedness (Jefferis, 1994; Appiah-Kubi, 2001)

1992 to 2000

In 1987, the Provisional National Democratic Congress (PNDC) government launched SOEs Reform Programme (SOERP), under the auspices of the State Enterprises Commission (SEC), IMF and the World Bank.

The SOERP attempted to enhance SOEs boards' accountability, and also facilitate the conversion of SOEs into shareholder-owned limited liability firms (Appiah-Kubi, 2001).

In 1988, PNDC government established the Divestiture Implementation Committee (DIC) to plan, monitor and evaluate all divestitures (see Divestiture of State Interest (Implementation Law, 1993, PNDC Law 326).

Consequently, the SEC focused on monitoring both the operations and performance of Ghanaian SOEs (International Monetary Fund, 2000)

In 1989, the SEC introduced performance contracts which compelled selected SOEs to submit annual reports in accordance with the Companies Code 1963.

Restructuring funds were made available to SOEs for acquisition of computer hardware and software including CAIS (Appiah-Kubi, 2001)

2000 to present

In 2003, the civilian government of the New Patriotic Party led by John Agyekum Kuffour attempted to improve transparency and accountability in SOEs by promulgating the Public Procurement Act, 2003 and Financial Administration Act, 2003.

In 2004, the Kuffour government sanctioned the Financial Administration Regulations (2004) which sets out the general rules of public funds.

(Adopted from Appiah-Kubi, 2001 and Uddin and Tsamenyi, 2005)

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Appendix Two: Interview Guide

This interview guide is designed to provide data for an academic research, and thus, information so provided would be treated confidentially.

Conception of Accounting Information System in Public companies: what and how.

1. From the perspective of your organisation, how will you define an accounting information system?
2. What is your AIS made up of / What constitute your AIS?
3. What are the inputs and outputs of your system?
4. Who are the users of the system?

Origin and motivation of AIS application in public companies

5. What system was used before the current system?
6. When did the company adopt using a Computerised Accounting Information system?
7. How many years has the organisation used the current system?
8. Why the change to the current system?
9. Did any of the following influence the change:
 - Concern for employees
 - Quality control
 - The need to increase performance
 - Current trend /Status required it
 - Complexities in data processing and collection.
 - Legal requirement
 - Achieving a mission and or vision statement.

Assessment of AIS in public companies

10. How do you define efficiency and effectiveness of a system?
11. On what basis do you determine an efficient and effective system?
12. From your definition, is your system efficient and effective?
13. How has AIS application contributed to the growth of your organisation?
14. How has the system improved on the following:
 - Performance of employees,
 - Productivity,
 - Employee motivation and relationships with customers?
15. What measures are in place to check abuse of the system?
16. How comfortable are you with the system?

Related Benefits associated with AIS application.

17. How has the system helped in achieving the organisational objective in the following ways:
 - Customer satisfaction
 - Decision making and communication
 - Cost reduction
 - Speed and accuracy of processing data and accessing information
 - Effective employee relation and motivation

Challenges of CAIS application to Public companies

18. What are the major problems encountered in your application of these systems?
19. Is the organisation planning to change the system soon or in the future?
20. If yes, why?
21. Do you think there is a way to improve the operation of the system?