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Identification Systems Adoption in Africa; The Case of Ghana

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Abstract

A number of Identity Management Systems (IdMS) have been implemented in many countries as an attempt to curtail incidences of crime and abuse of privacy, and to give citizens easy and seamless access to services. Despite the numerous perceived benefits, a number of challenges continue to hinder successful implementations and adoption in Africa. Using concepts of technology adoption and fit-viability theory, this paper examines the critical factors affecting (IdMS) adoption. In this paper, a conceptual framework for IdMS implementation and successful adoption is developed and validated with findings from a survey conducted in Ghana. The conceptual framework would offer policy makers the opportunity to determine the critical factors to be considered in (IdMS) implementations.

1 Introduction

Identity management projects have lately become a major issue capturing media attention and driving interactions between governments and citizens. The reasons for IdMS implementations have generally been to ensure high levels of security, efficiency, cost-effective provision of services promotion of commercial activity, and ensuring the rights of citizens to informational

self-determination (Beynon-Davies, 2007). Incidentally, implementation of IdMS that is capable of achieving these goals can be a very complex process requiring cooperation from a number of stakeholders (Aichholzer & Strauß, 2009). In their paper on understanding complex innovation, Aichholzer & Strauß (2009) argue that critical security and privacy systems architecture can be very challenging. These issues then presents a dilemma to policy makers leading to their preoccupation with technological features of the systems at the expense of analyzing the wider societal implications of the systems (Lips et al., 2009 and Aichholzer & Strauß, 2009). In spite of the numerous researches on IdMS implementation, there is still a dearth of literature on factors affecting IdMS adoption from a developing country's perspective. In this paper, we analyze the key factors affecting IdMS implementations and develop a conceptual framework for future implementations based on a survey conducted in Ghana.

The subsequent section discusses technological development in Africa and IdMS initiatives in Ghana. Section 3 discusses the research methodology and gives a brief description of the Technology Acceptance Model (TAM) and the Fit-Viability Theory. In section 4, we propose a conceptual framework for implementing IdMS from a developing country's perspective, a description of the survey in Ghana and ending with a discussion of the survey results. In section 5, we present our conclusions and recommendations for IdMS implementation and adoption.

2 Technological Development in Africa

Many African countries are technologically lagging behind. This has been attributed to several years of primitive cultural practices, bad governance, chaotic climatic conditions, poverty and illiteracy. Historically, natural disasters, landmark events and tribal body marks have been used as means of identification and reference points. These practices, which in the past served their purposes, have in these last days of rapid technological development proved very slow and unreliable, leading to improper forms of identification and authentication. In Botswana for instance, the findings of Uzoka & Ndzingo (2009) indicated that biometrics usage is at its infancy despite the fact that industries may be aware of its ability to strengthen security and pro-

ductivity. The emergence of mobile phones and the tremendous growth in cellular networks have made instant and reliable communication a reality in Africa. Cell phone subscription in Africa rose from 54 million in 2003 to 350 million in 2008 with a forecast average cell phone penetration of 80% by 2012 (Comminos et al., 2008). In Ghana, this 80% penetration rate has already been achieved (GBN, 2010). This technological growth is driving a gradual shift in Africa towards implementation of various biometrics based identity management and electronic payment systems. Throughout Africa, governments are moving towards various national IdMS with the enactment of various laws. The Payment Systems Act (ACT662) and National Identification Act (ACT 707), (NIA, 2010) are key examples. These technological developments are however not without challenges. Policy makers, security agencies and the private sector are bedeviled with a particular type of cyber-crime popularly known in Ghanaian parlance as “sakawa” (Slater & Kwami, 2005). 419 cybercrimes have already become an international issue in Nigeria (USDoS, 1997).

2.1 Identity & Identity Management Systems

Identity has several dimensions. Psychological identity is the distinguishing characteristics of an individual, whilst social identity refers to the positive self-concept of individuals such as organizational membership, religious affiliation, gender and age group (Tajfel & Turner, 1985). In information systems, identity consists of traits, attributes, and preferences, by which one may receive personalized services either online, on mobile devices, at work, or in many other places (Liberty, 2004). Identity consists of both physical and digital identity. In Bhargav-Spantzel et al. (2007), digital identity may be any kind of characteristics associated to an individual and may take the form of user logins, identity attributes (eye colour, date of birth, etc.) and identifiers (account number, vehicle license plate).

Identity Management Systems have been used throughout history to establish the basis for trade and governance using different tokens and technologies, seals, coded messages, signatures, and jewelry, etc. (3G_Americas, 2009). Existing literature contains several and sometimes overlapping definitions of IdMS. Depending on the situation and the context, an individual may be represented by different partial identities (Clauß & Köhntopp, 2001). Hence, identity management can mean different things to different people

depending on the context (Van Thuan, 2007). In this study, IdMS consists of processes, policies and technologies to manage the complete lifecycle of user identities across a system and to control a user's access to the system resources (Van Thuan, 2007). A good IdMS can assist users in acquiring better knowledge about individuals, which is essential in building a certain level of trust. Similarly, IdMS can be a reliable means of protecting the privacy of parties to transactions. An effective IdMS ensures real-time identification and authentication to distinguish one person from the other.

2.2 Identity Management Initiatives in Ghana

In Ghana, several independent IdMS initiatives are under way. The National Health Insurance Scheme has already rolled out a nationwide registration by issuing identity cards to beneficiaries. Birth and death, voters' registers, business registrations and social security are other forms of registrations performed by various government agencies in different formats and databases. The government has recently implemented biometric based passports and driver's and vehicle licenses. These two projects have been very successful concerning user adoption with the only issue being delays in issuance of passports or the driving licenses. To enhance commercial activity and to reduce the unbanked and under-banked population in Ghana, a biometric based payment system (e-zwich card) was also implemented by the Bank of Ghana (Frempong, 2010). According to France & Selormey (2009) GhIPSS opted for biometric technology because of its superior security in terms of user authentication and its ability to combat card cloning. The e-zwich project has however failed to live up to the expectation even though the goals seemed laudable from the government's point of view (France & Selormey, 2009). National Identification Authority is in the process of rolling out national identity cards.

3 Methodology

This is a country study research on IdMS implementation from a developing country's perspective. The key question addressed in this paper is "What factors influence adoption of Identity Management Systems in developing

countries?” Empirical data was gathered by consulting related studies on privacy and IdMS implementation, stakeholder interviews and self-administered questionnaires. From the literature review, it became apparent that Davis’ (1989) Technology Acceptance Model (TAM), and the fit-viability theory (Tjan, 2001 and Liang et al., 2007) were relevant to the study since they offered better constructs. Opinions of typical Ghanaian adults were used as the unit of analysis. The questionnaire was designed based on the results of the initial interviews. A multiple-item approach was adopted where each item was measured on a five-point Likert scale, with answers ranging from “strongly disagree” to “strongly agree”.

The items in the questionnaire were developed by adapting existing measures validated by other researchers in IdMS, or by converting the definitions of the construct into a questionnaire format. The questionnaire consisted of five main sections. The questions in section 1 were aimed at gathering demographic information such as gender, age group, occupation, educational background and level of income. Section 2 focused on the citizen’s perceptions and understanding of issues like privacy, security and controls in identification systems. Section 3 dealt with perceived usefulness and perceived ease of use. Section 5 then focused on economic feasibility and transaction cost. In total, there were 43 questions. The results of the analysis form the basis for the development of the conceptual framework. The research is significant since it addresses identity management issues within the context of developing countries, scarcely represented in the IdMS literature.

3.1 Technology Acceptance Model (TAM)

Factors affecting technology adoption and diffusion of innovation have been extensively studied with several theories emanating from it within Information Systems literature. Notable among them are the innovation diffusion theory (Rogers, 1983), technology acceptance model (TAM) (Davis, 1989) and the unified theory of acceptance and use of technology (UTAUT) (Venkatesh & Davis, 2000). In Davis’ (1989) TAM for instance, what causes people to accept or reject information technology has mainly been attributed to its perceived usefulness and perceived ease of use. External pressure to adopt has also been identified as another factor affecting technology adoption (Dass & Pal, 2009). Additional factors include complexities, compatibility and relative advantage. In Davis (1989), perceived usefulness describes the

degree to which a person believes that an innovation will boost their performance. Perceived ease of use on the other hand describes the degree to which a person believes that adopting an innovation will be free of effort. Where a system is high in perceived usefulness but it requires a great effort from a user, it is believed that its benefits will be eroded by the efforts required and thereby dissuading users from using it. In effect users are more likely to adopt systems which are easier to use and offer some benefits. Even though they are aimed at deepening understanding of factors affecting adoption these studies have mainly focused on developed countries. Other factors like free riding, connectivity and illiteracy that are peculiar to developing countries will also be covered in this study.

3.2 Fit-Viability Model

Liang et al. (2007) adapted Tjan's (2001) two dimensional fit-viability model for measuring the extent to which a new technology will fit into the core competence, structure, value and culture of organization and how viable it could be. In their model, Liang et al. (2007), defined technology viability as the measure of the extent to which the organizational environment is ready for the application, as well as its economic feasibility, technical infrastructure, and social readiness of the organization. Fit measures the extent to which the technology is capable of meeting the requirement of task. They came to the conclusion that organizations must only pursue applications with good fit and strong organizational viability. Economic feasibility is a key indicator used to measure an organizations' readiness to implement a technology. The two main criteria for measuring economic feasibility are cost benefit analysis (e.g. net present value) and transaction cost analysis, where reducing costs can increase a customer's willingness to use a technology (Spraakman, 1997). A high-transaction frequency on the other hand reduces transaction costs and the usage of the application. In effect transaction cost is higher where there is lack of usefulness and ease of use.

4 IdMS Conceptual Framework

TAM has proven to be a very useful tool for understanding and predicting user behavior in information system implementation since it seeks to place administration and control of information directly into the hands of users (Aichholzer & Strauß, 2009). The following constructs are therefore adapted from the theoretical framework and privacy related literature:

- *Perceived Usefulness* is the degree to which a person thinks that using a particular system will enhance his or her performance. In the IdMS adoption, it is concerned with how users believe the system can enhance their daily transactions and interactions. In effect high perceived usefulness will lead to a high intention to accept identification systems.
- *Perceived Ease of Use* is the degree to which a person believes that using a particular system will be free of effort (Davis, 1989). In IdMS implementations, the enrolment process, ability to gain access to different services, training and support ensures ease of use. Other factors include network anonymization tools and minimum disclosure of personal information (Cavoukian, 2008).
- *External pressure to adopt* (Dass & Pal, 2009): Where there is a certain level of force or the system is made mandatory for business transaction, adoption is high. For instance passports are mandatory for international travels and for that matter citizens will be under pressure to adopt a biometric passport
- *Privacy* is the right of an individual to decide what information about himself should be communicated to others and under what circumstances (Westin, 1970). It is about the right of individuals to choose how they want to live their life, and what things they want to keep private (De Hert, 2008). In effect privacy refers to the claim or right of individuals to exercise a measure of control over the collection, use and disclosure of their personal information (Cavoukian, 2008). Users are more inclined to adopt Identity Management Systems which offer a high level of privacy assurance.
- *Trust* is the state of readiness for unguarded interaction with someone or something (Tway, 1993). Trust can be influenced by perceptions of intentions and past experiences. In Ghana for instance many business people perceive that national identification systems can be used for tax purposes or political witch-hunting and will therefore find various means to

avoid it. Negative perception on trust can have a direct effect on attitudes towards the system. High reliability and privacy protection policies will lead high level of trust.

- *Technology Fit* (Tjan, 2001): Technology fit issues are qualitative factors that determine to what extent an investment fits into the organizations' processes, capabilities and culture. Fit issues are therefore 'internal' factors that influence the system design. In developing countries, such internal factors are literacy rate, level of political tolerance, infrastructure, cultural norms etc.
- *Viability* issues deal with the expected return the system is able to generate, such as the value-added potential, cost and associated benefits.
- *Transaction Cost*: Many people are reluctant to pay for government services even if they directly affect their livelihood. Therefore any system requiring high transaction costs is bound to fail in developing countries unless there are no alternatives.

The diagram below is a summary of the factors which must be considered in IdMS implementation to ensure successful adoption. Privacy and trust issues and technology fit characteristics must affect the four inner boxes. In effect even if the system is very useful and easy to use, negative perception of trust can affect successful adoption by users.

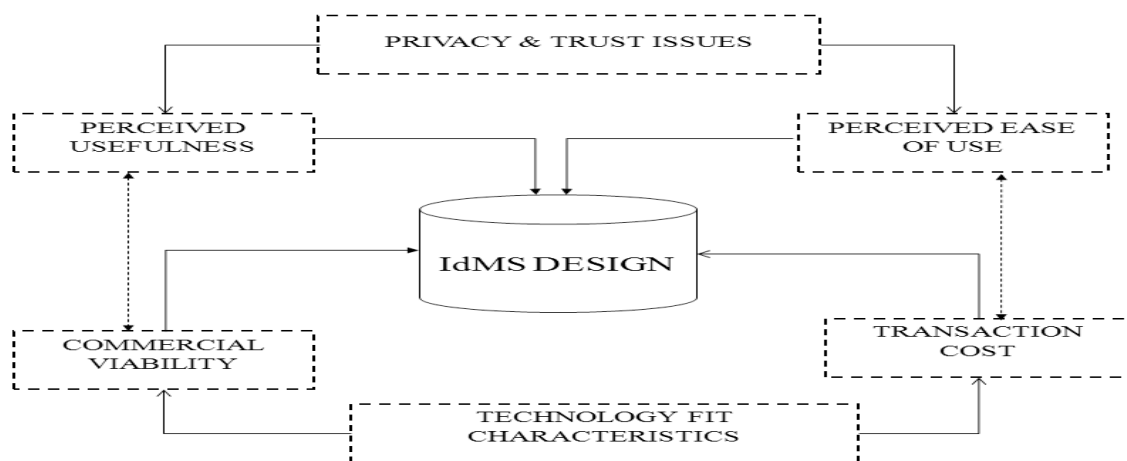


Figure 1: IdMS Conceptual Framework.

4.1 IdMS Adoption Survey in Ghana

In an attempt to determine factors affecting IdMS adoption we conducted a survey using stakeholder interviews and a questionnaire. The objective of the interviews was to acquire better understanding of the issues involved in national IdMS implementation, which will influence the design of the questionnaire. The interview focused on the key officials National Identification project and government's electronic payment system (e-zwich project). We also interviewed key officials of major commercial banks and trading merchants and two groups of citizens: those who have acquired the e-zwich cards and those who have not. An interview guide was designed to ensure consistency and to ensure that researchers focus on the IdMS related issues.

In the case of the questionnaire, a group of executive masters in administration (EMBA), participants of the Ghana Institute of Management and Public Administration (GIMPA) were selected. This group was selected because they represent a typical group of opinion leaders whose views on national IdMS were the unit of analysis. Additionally, we found it to be very cost effective due to budgetary constraints and offered me to explain the rationale behind the various questions to the respondents. 250 questionnaires were administered and 230 responses were received and analysed. The key constructs stated in section 4 above were used to develop the questionnaire.

4.2 Results and Discussion

Based on employment positions, 95% of the respondents occupy managerial positions. Even though National Identity (NID) Cards systems encounter a lot of opposition in Western countries, particularly the US and the United Kingdom, 90% of respondents believed that NID cards must be compulsory for all Ghanaians. Another interesting finding was that 80% of respondents prefer that cards be issued to citizens free of charge as a means of achieving universal coverage and forgery prevention. Another interesting finding from the survey was that the respondents were unanimous in their responses to questions on governance, policy and monitoring. For instance, they all believed that their interest would be considered in deciding how identity data is

used which is consistent with Davis' (1989) suggestion that the design characteristics of a system exert immediate effects on perceived usefulness as well as indirect effects via perceived ease of use.

Even though security is a major concern in the West, in this survey respondents rather believed that the system will be secure and for that matter their personal data will not be affected even though they believed there are some risks involved due to the lack of competent personnel to manage the databases. Concerning complexity in the use of the cards, the majority of the respondents did not think it would be very difficult to use. A further probe however indicated that this believe stems from the fact that respondents have all used ATM cards and thought the NID cards even in its advanced form may not be anything different. They also believed that the introduction of the identity cards will not have any negative impact on users' personal information and that they were prepared to trade off some privacy for convenience, security and faster access to public service. Strangely, all the respondents were willing to allow identification authorities to share their personal data with other government agencies and private businesses. The analysis showed that among those who did not want identification systems to reveal their identity 90% were business owners. Where IdMS are required for key business activity to take place, adoption is usually high (e.g. passport and health insurance card).

5 Conclusion and Recommendation

This paper has identified factors influencing adoption of IdMS from a developing country's perspective. It has shown that security issues and anonymity, which are very critical in developed countries, are not the major concerns in developing countries. Rather, connectivity, costs of equipment, taxation and political motives were the key factors. Additionally, even though IdMS are very much welcome in Africa, there is a strong perception that they must be free for all citizens. This has a direct implication on sustainability of such systems unless they are associated with critical services like passports and driving licenses. In effect, to achieve high levels of IdMS adoption, policy makers must go beyond perceived usefulness and ease of use and deal with the key inhibiting factors.

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References

- 3G_Americas. (2009). Identity Management; overview of standards & technologies for mobile and fixed internet. 3G America whitepaper.
- Aichholzer, G. & Strauß, S. (2009). Understanding a Complex Innovation process: Identity Management in Austrian E-Government. The Proceedings of the 10th International Digital Government Research Conference.
- Aichholzer, G. & Strauß, S. (2009). The Citizens Role in National Electronic Identity Management: A Case-study of Austria. Second international Conference on Advances in Human-Oriented and Personalized Mechanisms, Technologies, and Services. Porto, Portugal.
- Beynon-Davies, P. (2007). Personal identity management and electronic government; the case of the national identity card in the UK. *Journal of Enterprise Information Management*, Vol. 20 (No.3), 244–249.
- Bhargav-Spantzel, A., Camenisch, J., Gross, T. & Sommer, D. (2007). User centricty: a taxonomy and open issues. 15.
- Cavoukian, A. (2008). The case for privacy-embedded laws of identity in the digital age. Technical report.
- Clauß, S. & Köhntopp, M. (2001). Identity Management and its support of multilateral security. *Computer and Networks*, 37, 205–219.
- Comminos, A., Esselaar, S., Ndiwalana, A. & Stork, C. (2008). Towards Evidence-based ICT Policy and Regulation M-banking the Unbanked. Policy Paper 4, IDRC.
- Dass, S. & Pal, S. (2009). Feasibility and Sustainability Model for Identity Management. India: IIMA Research and Publications.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, 13(3), 319–340.
- De Hert, P. (2008). Identity management of e-ID, privacy and security in Europe: A human rights view. *Information Security Technical Report* (13), 71–75.

- France, F. & Selormey, D. (July/August 2009). Biometrics improving financial accessibility. *Biometric Technology Today*, S. 10–11.
- Frempong, B. (Wed, 28th. April 2010). E-zwich is the dominant money transfer system in Ghana. <http://www.citifmonline.com/site/business/news/view/5232/3>
- GBN (2010). Ghana's mobile penetration expected to hit 100% in 2013. <http://www.ghanabusinessnews.com/2010/06/08>
- Liang, T., Huang, C., Yeh, Y. & Lin, B. (2007). Adoption of mobile technology in business: a fit-viability model. *Industrial management & data systems*, 107 (8), 154–169.
- Liberty. (2004). Whitepaper: Benefits of Federated Identity to Government. Liberty Alliance Project.
- Lips, A. M., Taylor, J. A. & Organ, J. (2009). Managing Citizen Identity Information in EGovernment Service Relationships in the UK. *Public Management Review*, 11 (6), 833–856.
- NIA (2010). National Identification Authority. Editorial; NIA News, 1.
- Rogers, E. (1983). *Diffusion of Innovations* (third ed.). New York: The Free Press.
- Slater, D. & Kwami, J. (2005, June). Embeddedness and escape: Internet and mobile use as poverty reduction strategies in Ghana. Information Society Research Group (ISRG) Working Paper Series.
- Spraakman, G. (1997). Transaction cost economics: a theory for internal audit? *Managerial Auditing Journal*, 12 (7), 323–330.
- Tajfel, H. & Turner, J. C. (1985). The social identity theory of intergroup behavior. In S. W. Austin, *Psychology of intergroup relations* (2nd Ed., pp. 7–24). Chicago: Nelson-Hall.
- Tjan, A. (2001). Finally, a way to put your internet portfolio in order. *Harvard Business Review*, Vol. 79 (No. 2), pp. 76–85.
- Tway, D. C. (1993). *A Construct of Trust*, Dissertation.
- USDoS. (1997). Nigerian Advance Fee Fraud. United States Department of State Bureau of International Narcotics and Law Enforcement Affairs.
- Uzoka, F.-M. E. & Ndzingo, T. (2009). Empirical analysis of biometric technology adoption and acceptance in Botswana. *The Journal of Systems and Software*, 82, 1550–1564.
- Van Thuan, D. (2007). *Identity Management Demystified*. 3 (4).
- Venkatesh, V. & Davis, F. (2000). A theoretical extension of the technology acceptance model: four longitudinal field studies. 46 (2), pp. 186–204.
- Westin, A. (1970). *Privacy and Freedom*. New York: Atheneum.