Full Length Research Paper

Socio-Technical Perspective for Electronic Tax Information System in Tanzania

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ABSTRACT

Socio-technical systems theory has rarely been used by system architects in setting up computing systems. However, the role of socio-technical concepts in computing, which is becoming social in nature, has made the concepts more relevant and commercial. Tax information systems are examples of such systems because they are influenced by external variables such as the political environment, technological trends, and social environment, introducing complexity in their deployment and determining the type of e-services and their delivery to a diverse group of people. It was observed that in Tanzania there is resistance, reluctance and minimal use of electronic tax system because of insufficient end-user support and their involvement in constructing the system. Therefore, there is need to develop an electronic tax information system using socio-technical systems perspectives to ensure design of an efficient user-friendly tax administration system. The research used the qualitative approach, featuring case studies in Korea, Chile, Tanzania, and Denmark. The study used best practices from the Organization for Economic Cooperation and Development (OECD) to benchmark Tanzania Revenue Authority current practices. It was found that tax models implemented are techno-centric push models, which don't attract its use by tax payers and requiring human intervention in its operation, hence not cost-effective. As the first and relevant phase in socio-technical system development, this paper presents the problem definition and analysis of e-Tax collection system in Tanzania.

Keywords: Socio-technical Systems, Human Centred Design, Software Engineering, Tax Information System, Government.

INTRODUCTION

Socio-technical systems (STS) are systems that involve complex interactions between technology and social subsystems that must be considered and optimized during the design process. These systems are flexible and respond to changing environments. Social factors such as person, community, organization, context of use, utility, laws, and regulations have a big influence on STSs (Maio, 2014). Most system designers and engineers have abandoned socio-technical system

design concepts in favor of other design methods to ensure quality (Ghaffarian, 2011; Yurtseven and Buchanan, 2013). The dominant drawbacks of the existing socio-technical system frameworks are the voluminous dataset, complexity, and inefficiencies of the framework for large scale projects. However, the concept has been constantly revised and adapted to current practices and technological changes and social needs.

The e-government systems, including e-tax, need STS since they are influenced by social and political environments. Therefore, they must address social and cultural barriers like low income or limited capital or infrastructural support or skills or behavioral patterns or internet access to improve usability. In providing e-services to people, most governments have implemented user-centered approaches, such as Sweden's customer-centric approach. However, the use of paper means in the form of filled forms for public authority approval is still high, resulting in long lines in such offices (European Union, 2015). However, electronic systems that focus on technology only are bound to fail because of the complex interdependencies between social and technological components (Maio, 2014). Such designs decontextualize the problem to save time and space (Yurtseven and Buchanan, 2013). The use of socio-technical based systems can increase acceptability of electronic systems.

User-centered STS approach focus on technology closure and goal-directed method making it easier for system designers to work with technology (Herrmann and Nolte, 2015). Socio-technical theory considers during system design and development process preference of each user with differing level of participation compared to other methods. Flexible systems are

advocated to enable users shape and manage their work.

This paper looks at the use of socio-technical concepts in the development of tax revenue collection system (e-tax). Currently, e-tax uses authoritative, proven, and rule-like procedures to enforce compliance where policies, regulations, human behavior, infrastructure, digital divide, and accountability are involved. CIAT (2018) state that current tax rules fail to capture the new ways in which profits are created in the digital world, in particular the role that users play in generating value for digital companies. As a result, there is a disconnect – or ''mismatch'' between where value is created and where taxes are paid. The use of STS can address that.

Tanzania is using a hybrid of secure-chain approach where data is collected using fiscal devices and a centralized data approach using an electronic payment gateway. To fix the flaws of either strategy, most countries use a combination of centralized and secure chain approaches (OECD, 2014).

However, there is reluctance in the use of e-tax system in Tanzania, particularly for Small Scale Entrepreneurs (SMEs) because the fiscal devices in use are expensive (Mandari *et al*., 2017; Casey and Castro, 2015; Mzenzi *et al*., 2016). Also, the low compliance is due to fragmentation, difficulties in accessing online payment, and value added tax charged in all products (TAKNET, 2010; Deloitte, 2015). An effective system can be designed to overcome the inherent challenges of earlier methods based on a combination of three concepts; Soft Systems Methodology (SSM), Agile method, and Object-Oriented Analysis and Design (OOAD).

METHODS TO DEVELOP HYBRID SOCIO-TECHNICAL SYSTEMS

Soft Systems Methodology

Soft Systems Methodology (SSM) is very effective in collecting and analyzing system requirements for information system development, which is necessary in software design. It enables understanding of the problem situation and breaking it into subsets of change using holistic approach (Burge, 2015). Interviews, observations, and workshops are used guided by organizational actors. The problem situation from different perspectives is evaluated to understand the internal illogicalities between future structures and future consequences, and find workable and acceptable actions to be adopted to improve the system and not a system design. However, it needs support of other concepts to facilitate complete software design process.

Agile Method

Agile method offers tools complementing SSM by capturing and working with a subset of data obtained from social setting or working environment using a story format that details a problem situation in a way that a designer can easily find solution that are best fit for the particular context or environment. It allows for rapid development with a robust framework for verification and validation of the design (OGCIO, 2015). Agile method is iterative allowing designers to collect feedback and evaluate effectiveness of the design as the project progresses and changes through daily stand-up (scrum). Radiators are used to visualize project progress and different project items openly to ensure transparency and encourage democracy in the development process. This method needs OOAD for better visualization and interaction with designers and users.

Object-oriented Analysis and Design Method

Object-Oriented Analysis and Design (OOAD) method enable visualization and present objects and their interactions to facilitate system developers, users and designers to document, learn, and understand the system. System models are created showing interdependencies between objects, relationships, data flows and underlying structures using charts and diagrams (Avison and Fitzgerald, 2006). The models enable stakeholders to provide feedback on requirements and structure in technical and non-technical manner. OOAD combines two abstractions of software development: the object-oriented analysis (OOA) and object-oriented design (OOD). This method does not separate technical and social parts, but make one lead the other. It is envisaged that combining the three method will offer the best practical approach to design acceptable e-tax systems.

LITERATURE REVIEW

Socio-Technical Concept

Effective Technical and Human Implementation of Computer-supported Systems (ETHICS) introduced the socio-technical concept building a strong foundation for the discipline (Leitch and Warren, 2014). Follow up extension and modifications of socio-technical systems concept include human centered approach, cognitive engineering, soft systems method, cognitive workplace analysis, human computer interaction and context design to fit into different environments (Baxter and Somerville, 2011; Morris, 2009). Maio (2014) state that the

introduction of IT and the digital community, moved the technical part closer to people, creating complex relationships between human and technology making Socio-technical theory more relevant.

Socio-technical point of view accepts that people are the essential piece of any effective framework and along these lines assumes a significant role in the structuring of such framework to meet their operational objective (Morris, 2009; Whitworth, 2011). System specification by software engineers inclines mostly to fulfill technical aims and very little on human needs and interests. STS considers broader requirements covering hardware, software, personal/individual, organization, group and community aspects as shown in the Figure 1.
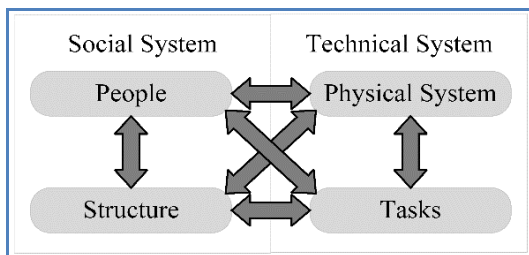

Figure 1: Socio-Technical System (Source: Oosthuizen and Pretorius, 2013)

According to Oosthuizen and Pretorius (2013)

- People perform work in organizations, utilizing technological artifacts, to achieve economic performance and job satisfaction.
- The social subsystem addresses structure of the organization, encompassing authority structures and reward systems, and people in the organization with their knowledge, skills, attitudes, values and needs.
- Physical System, which are physical resources for the human

operators to achieve the purposes of the system.
- Tasks, which tend to be time limited with decisions and actions that depend on feedback.

Development phases of the Socio-Technical System

There are three major development phases of the Socio-technical systems: problem definition and analysis, system design, system implementation and post-deployment has to be followed (Karve, 2020).

(a) Problem definition and analysis

According to Karve (2020) the first step in Soft Systems Methodology (SSM) is to formulate the Root Definition of the System you are studying, analysing or designing. A Root Definition is a structured description of a system. It is a clear statement of activities which take place (or might take place) in the organization being studied.

Karve (2020) stated that root definition comprises of three elements:
- "What" the system does. What is the immediate aim of the system?
- "How" the system does it. How is the means of achieving that aim?
- "Why" the system is being done. Why is the longer term aim of the purposeful activity?

The root definition element is presented as; *A System to do X, by (means of) Y, in order to achieve Z*

Where X is What, Y is How and Z is Why.

(b) System Design

Design/modelling follows definition and analysis gradually and interactively

with the client at each stage using Agile technique. Negotiation with client may be required at each at stage.

(c) System Implementation

After design, implementation follows using framework engineering/ architecture refined in the design stage to inform the system implementation team. System implementation involves coding and planning. Framework testing and audits is done in this phase to guarantee quality and adjustment to the needs of the client functional and non-functional specifications. Client's ideas during execution are captured through review meetings, every day stand-ups, and demonstrations (JAD meetings) which incorporates acceptance testing driven by a system analyst. Demonstration meetings are done in the field/clients and experiments or create scenarios that can be tried by the end-users to ensure thorough end-user engagement and empowerment.

(d) Post-Deployment

The system performance can be measured using technical metrics including mean time to failure (MTTF), mean time to recover (MTTR), integrity

checks, security checks, and other technical measures. Attractiveness and user satisfaction can be measured through provision of feedback forms, suggestion boxes and regular checks with the customers while interacting with the system such as asking the customer simple yet meaningful questions.

CATWOE analysis framework

CATWOE analysis helps in proper formulation of a Root Definition (Karve, 2020). Mulder (2017) stated that the SSM can be used to solve certain problems in business processes, but for the SSM to be more successful, CATWOE method is being applied. CATWOE is defined as Customers (C) – Actors (A) – Transformation process (T) – World view (some authors referring to Weltanschauung) (W) – Owners (O) – Environmental constraints (E).

According to Mulder (2017) and as shown in Table 1, the CATWOE analysis allows identifying problem areas, what a company can achieve, and solutions to influence the stakeholders. The analysis uses thought solutions from multiple perspectives.

Table 1: CATWOE Analysis framework attributes (Burge, 2015)

CATWOE	Description
Customers	Identify customers from organization, encounter their problems, understand how system influences them and provide solution.
Actors	Actors are organization employees who perform transformation process. They are carrying work and provide clear impact on the process or system.
Transformation	Transformation is the process used to transform the input (including raw materials and man-hours) into the output (end results)
World View	This is the 'bigger picture' involving different stakeholders and interested parties surrounding an organization and how they can influence the organization.
Owner	These are higher authority's decision makers, responsible to make changes and decide whether a project should start or stop. They can be owner, entrepreneur or investor of an organization.
Environment	They are actual environmental elements that may influence the organization and can limit or restrict the system.

SOCIO-TECHNICAL CONCEPTS IN THE CONTEXT OF e-TAX

According to Maio (2014) IT and the digital community, moved the technical part closer to people, creating complex relationships between human and technology making Socio-technical theory more relevant and applicable to e-tax.

Tax information systems are socio-technical systems since they involve large variety of stakeholders like individuals, groups, and organizations (Sanitary *et al*., 2014) thus influenced by the external environment. The challenge therefore is to find how to design e-tax to ensure that it is effective, efficient and acceptable by users including designers based on socio-technical concepts (Ghaffarian, 2011).

Approaches Used in Developing e-Tax Information Systems

(a) Secure Chain Approach

In this approach business transactions are automatically captured by accounting systems using electronic fiscal devices (IOTA, 2017), assuming that non-compliance is caused by unintentional errors and poor record system, which can be corrected using programmed fiscal devices integrated into business processes. However, weak link is primarily within the context of use in the real world (FTA, 2010; Sadok and Bednar, 2017). Therefore, to address this people, structure, processes and technology contributions need to be optimized to achieve a good system performance (Sadok and Bednar, 2017).

(b) Centralized Data Approach

In this approach information is obtained indirectly from the taxpayer through e-invoicing and e-payments, which is used to evaluate tax obligation and detect fraudulent activities. However,

tax evasion or risks can be masked by anomalies caused by faulty data or natural causes (OECD, 2014).

A mix of centralized and secure chain approaches is used by most countries to address weakness of either method (OECD, 2014). Most e-tax systems use technology focused secure chain and centralized data approaches (OECD, 2014). However, as recommended by FTA (2010) there is need to use STS perspective theory to improve the design and effectiveness of e-tax by capturing the human factor.

Tax Revenue Collection Systems in Different Countries

Denmark

The Danish e-tax systems (SKAT–TastSelv) called 'no touch' system eliminate physical contacts between tax authority and taxpayers. Tax payer only interacts with the tax authority using an annual tax card where preliminary assessment details are provided. Most details are entered by external parties such as employers and other authorities for property ownership. The EasySME system makes use of a secure chain to enforce tax compliance where SME use single account with the designated bank, and make use of certified accounting software interlinked with the bank (OECD, 2014).

Chile

A centralized approach is used to capture from the source tax information to decide the right amount to be taxed. The system generates a third-party report to the tax authority for auditing purposes. The revenue authority can also receive data on taxpayer's business transaction from banks, government and other parties transacting with the taxpayer (OECD, 2014). This system work in a very systematic way starting from sellers where they must produce

standard electronic invoices stamped with SII eStamp and send to buyers via email or physically.

Korea

The centralized approach used support a free online system to issue and distribute tax invoice. A supplier makes use of accredited certificate to log into eSero online system to produce an eInvoice and email to the buyer. Large corporations can make use of their ERP system to issue and send eInvoices while small businesses without internet access can use telephone or tax officer (OECD, 2014).

Tanzania

Tanzania initially used block management system which used periodical surveys to collect tax from SMEs. Electronic tax filing system to simplify tax returns was introduce in 2012 using EFD (Morisset *et al.*, 2015). Tax payers are reluctant to comply because they considered electronic fiscal devices expensive making it a semi-automated system. A revenue gateway system linked to the bank of Tanzania, commercial banks and TRA system was introduced in 2013 (PWC, 2015; TRA, 2016) which made Tanzania to rank 2nd in time needed to process tax returns in East African Community (EAC) countries (PWC, 2015) and above Africa average in number of payments. The use of different systems in different countries and continuous revisions shows the complexity involved and continuous need for improvement.

STUDY APPROACH

Explanatory and qualitative approaches were used to collect data based on experience, explanations, decisions, cases, opinions, scholarly research, and other situational and qualitative variables to get requirements.

Sampling

Deliberate and convenient sampling technique was used. Selected institutions involved are: Tanzania Revenue Authority (TRA), Tanzania eGovernment Agency, Small, Micro and Medium Enterprises, and Dar es Salaam Municipal Councils because of their relevance, purpose, contribution to the field of study, and accessibility.

Data Collection and Analysis

The data collection was primarily based on literature and document reviews supported by a limited number of formal interviews. Interviews at TRA headquarters were done at the directorate of research, planning and policy on their experiences and documentations on revenue collection system. This includes technology, infrastructure and systems deployed and strategies instituted to enhance tax collection and increase tax base. CATWOE analysis framework was used to analyse root definition requirements.

e-TAX SOCIO-TECHNICAL SYSTEM DESIGN IN TANZANIA

Using literature it was identified that using socio-technical concepts to develop tax e-systems can make them efficient, usable, useful, and acceptable since design is embedded well in the society not achieved by technical system alone. Hence, mutual constitution of technical and social subsystem can achieve expected results (Whitworth, 2009; Yurtseven and Buchanan, 2013). Tax information systems that is continuously acceptable to a wide variety of users should always be redefined, reviewed, and revised to adapt to the changing circumstances of use, external conditions impinging its use or functionality and response to

technology development. The findings on e-tax system status in Tanzania, bottlenecks, and how to address the challenges using socio-technical perspective is presented.

Electronic Tax Information System in Tanzania

Tax collection in Tanzania is being managed by three departments in TRA: large tax payers, domestic revenue, and customs and excise departments. TRA also maintain a tax investigation department. The revenue departments are supported by a number of independent ICT systems including:

i.   Integrated tax administration system (iTAX);
ii.   Revenue gateway system;
iii. Taxpayer Identification System (TIN);
iv.   Computerized motor vehicle registration system (CMVRS);
v.   Used motor vehicle valuation system (UMVVS);
vi.   Electronic fiscal device management system (EFDMS);
vii. Electronic revenue collection system (eRCS);
viii. Tanzania customs integrated system (TANCIS); and
ix.   Computerized drivers' license system (CDLS).

The Bottlenecks in the Tanzanian e-Tax System

- Majority of the business in Tanzania are SME's (90%) having 1-9 employees experience challenge in using e-infrastructure to pay taxes such as computer literacy, electrical power, ICT tools and connectivity;
- Lack of manpower to support large taxpayer segments;
- Inadequate infrastructural support for e-taxation and technology use;
- Lack of cross vendor information systems;

- Reluctance of taxpayers to use the system (low user acceptance); and
- The systems are techno centric push models.

Overcoming the Challenges Using Socio-Technical System Concepts

Using socio system which sits next to the technical one making it secondary when designing e-tax system thus socio system guiding the whole system or vice versa is not appropriate (Whitworth and Ahmad, 2013). Therefore, socio-technical inquiry should be used to generate requirements, analyze and used in e-tax system design and implementation phases so that neither dominate the process (Whitworth and Ahmad, 2013). Thus an engineer can prepare the right environment from predicting requirements and select right resources.

The e-tax system design using socio-technical concept has to follow systematic step-by-step process involving: problem definition and analysis, system design, system implementation and post-deployment phases. However, this paper is limited to problem definition and analysis phase of the socio-technical process.

Problem Definition and Analysis

SSM is used to determine social elements from real world in problem domain and in finding actions to be taken starting with root definition. Root definition in the context of tax collection using situation in Tanzania can be: *A government owned system has to collect revenues from the tax payers by the most appropriate means*.

This is transformed to generate needed output which is: Uncollected Tax Revenues → Collected Tax Revenues

With the support of Mulder (2017) and Burge (2015), the root definition on this was done using CATWOE analysis framework. Table 2 shows the CATWOE analysis in the Tanzania e-Tax environment before applying the transformations needed.

Then SSM approach was used to build a conceptual model (set of right activities to be taken). The necessary identified activities based on the root definition are:
1. Identify taxpayer needs;
2. Review the current processes for collecting tax revenues;
3. Develop strategies to attract taxpayers;
4. Identify the ways to collect taxes for each taxpayer segment;
5. Develop new systems;
6. Assess the efficacy of the new or improved process; and
7. Perform revenue collection strategy.

Table 2: CATWOE analysis

Sn	CATWOE	Description
1	Customers	Tax Payers
2	Actors	Employees
3	Transformation	Cost-Effective Revenue Collection System
4	Weltanschauung	Use human-centric pull model to increase compliance.
5	Owner	TRA
6	Environment	ICT Infrastructure, Digital Inclusion

Then a conceptual model is built using the above as shown in Figure 2 to represent the root definition activities. However, the core stakeholders suggested additional strategies for achieving transformation and these were:
- To identify system gaps that allows defaulters (system security);
- To make tax registration mandatory for all residents;
- Creating reports to public; and
- Monitoring and evaluation.

This subjected the modification of the set of initial activities from seven to eleven.
Before deciding a set of actions to be taken, it is important to have a complete understanding of the socio-technical environment as describe using Figure 2. Figure 3 gives a limited view of Tanzania revenue collection using two variables/strategies i.e. High Tax Rate and Low Tax Rate.
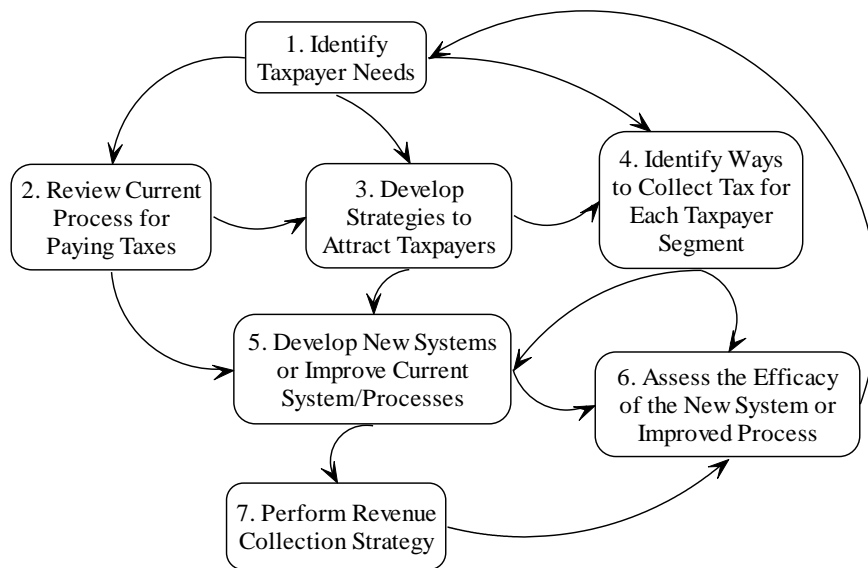
Figure 2: The Conceptual Model Showing List of Activities

Figure 3 shows the vagueness behind different strategies that can be adopted. Without careful planning, there is likelihood that the government will adopt the wrong strategy. According to Herrmann (2015), social-technical systems have both controllable and contingent structures which results in mutability and uncertainty of the system events in reaction to its environment and therefore creates vagueness that must be captured and learned using proper methods.

Bednar and Sadok (2015) and Ngowi and Mvungi (2018) reported that the emphasis on user participation can bring the conflict of interest between different levels of authority.

With the High Tax Rate and Low Tax Rate variables as shown in Figure 3 in e-Tax context, the decision to raise taxes can lead to the increase of states for the revenue and rising of welfare payments. However, the same can result in wealthy and business move-outs. Raising welfare payments reduces incentive to work for low pay and attracts people seeking work. Lowering taxes can result in business move-in which may indirectly increase employment opportunity. Lower taxes also increases tax base.

The SSM is then used to compare the logical model as depicted in Figure 2 into the real world, giving the set of actions that can perform the stated required transformations in Table 3.

STS presents choices thus a goal can be realized by more than one means. Therefore, SSM is used to find desirable actions and workable solutions, hence obtain requirement specifications for change to be taken including priority, resources needed and time scale. The selection of proper action is based on action to be taken and its result/consequence like when taxes are paid the government must be accountable (TAKNET, 2010).

The next in SSM step is to compare the logical model as depicted in Figure 2 into the real world. These are the set of activities that can perform the required transformations.
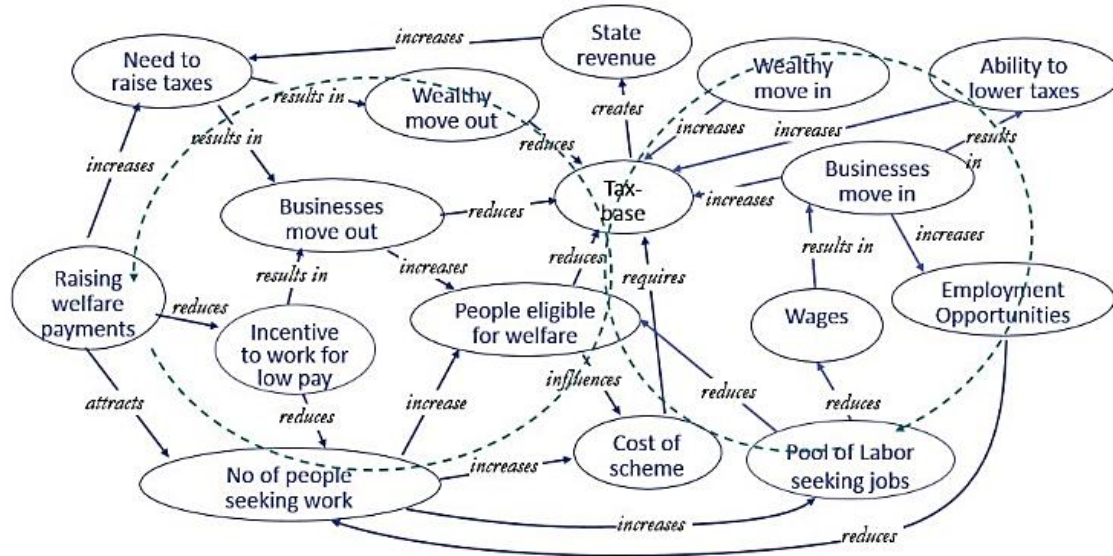
Figure 3: Schematic Diagram Showing Conflicting Values (Gasson, 2017)

The schedule in Table 3 lists which actions need to be taken on the basis of the evaluation of existing practices. However, not all actions would be desirable for users. Therefore, the soft system method is not only to find desirable action to be taken but also workable solutions. This includes social sustainability, feasibility, timescale, resources needed, cultural fitness, usefulness, implication on introducing such change, user acceptance, and priority or level of importance given. It is necessary for socio-technical design process to set and specify alternate goals before reaching a consensus based on their ranking and consideration given to their resource implications and constraints to decide which to take ahead (Adman and Warren, 2000). A social contract between the citizens and the government should be instituted. It is only when these fundamental conditions are met, the tax compliance will increase. From the desirable change matrix tool, action number three (3) "Create online user editable profiles pre-populated by TRA and often updated" was prioritized as both desirable and workable action. The workable action in a truly socio-technical solution does not look at technology closure or convergence, but at how this purposeful human activity can be changed and supported by technology.

Table 3: Mapping Set of Activities to the Real World

No.	Conceptual Model Activities	Real World	Which Actions to Take
1	Identify taxpayer needs	Currently done on an ad-hoc basis, tax officers inquire from taxpayers their needs and report to tax authority. Suggestion boxes are also used to collect opinions from taxpayers, perception cards, Radio and TV Programs, letters, e-mail, physical visit to TRA offices, telephone, perception surveys, call center and seminar evaluation forms (TRA, 2017).	Develop a systematic approach to increase effectiveness of collecting and learning customer needs. Or Leave as it is. It is just fine!
2	Review the current processes or procedures for collecting tax revenues	In line with the above, TRA use feedback from taxpayer to review and suggest improvement on the process (TRA, 2017).	Use formal approaches that allow incremental changes in reaction to user feeling on services.
3	Develop strategies to attract taxpayers	TRA standing by the motto *"We make it easy to pay tax and make lives better"* by ensuring simplified transparent processes, convenience and easy access to services (TRA, 2017). TRA has developed online gateway portals, mobile money tax payments services, Border Point of Sales (BPOS), TANCIS and tax agents (banks). More they engage taxpayers through tax education to sensitize and educate communities on importance of paying taxes.	Create online user editable profiles pre-populated by TRA and often updated.
4	Identify the ways to collect taxes for each taxpayer segment	Large Tax payers use online portal, Medium Tax Payers use EFD, Small Traders use Presumptive tax system, Individuals use mobile phone. All can make physical visits to TRA office (Tarimo, 2015).	Enhance methods for collecting taxes from all segments, especially the lower segment (small traders, informal sectors, and individuals).
5	Identify system gaps that allows defaulters (system security)	Currently, TRA perform tax audit and reward of up to TSh. 20 million for reporting tax evasion (TRA, 2017). System in place is Enterprise-wide Risk Management System (ERMS), Automated Tax Stamp System, Forensic Lab, and Integrated Enterprise Application Architecture.	Use socio-technical techniques to identify/close security gaps and make tax payment attractive, reasonable, and socially rewarding to tax payers.
6	Develop new systems (i.e. improve the current processes and/or procedures)	TRA has a five (5) year corporate plan that creates a road map of products and service offered (TRA, 2017). Fragmented systems obtained in piece meal basis from different vendors introduce complexity and cost of maintenance.	Review procurement procedures of new information system and/or use socio-technical concepts and/or approaches to develop and/or improve processes. Or Integrate the systems as one unit from single or few vendors to reduce complexity and total costs of ownership.
7	Make tax registration mandatory for all residents.	Not done. Only business and property owners are given TIN.	Register every citizen/resident with TIN number. (Each person consumes taxable services and products).
8	Assess the efficacy of the new or improved process	Key Performance Indicators, Strategic Measures and Perception Indicators which are monitored, measured and reported throughout corporate plan implementation.	Not Needed
9	Report to the public results	TRA report to public through websites publications and news media.	Extend an interface to users for easy access to information. E.g. user portal dashboards. OR Leave as it is. It is just okay.
10	Monitoring and Evaluation	TRA monitor and evaluate the performance based on the set service standards on quarterly basis.	Not Needed

The goal is to create a human-focused solution, not a technology-focused solution. So, starting by considering the social complexities of implementing such a solution and how technology can be used to solve the problem by analyzing user persona models. Such individuals are based on fictional characters for the purpose of understanding and explaining the method. According to Giacomin (2012), the use of personas or scenarios in design provides a better opportunity to facilitate interaction, learning and imagination. Personas are used throughout the design and construction phase to reflect user contextual requirements. It is common during requirements determination to start with business requirements, followed by user requirements then functional and non-functional requirements in the analysis phase finishing with systems requirements during the design phase (Dennis *et al*., 2012).

The following stage is the design stage whereby system requirements will be developed using STS Principals.

(a) System Design and Deployment

In this stage, the logical models made during the requirements investigation utilizing OOA are currently changed using OOD procedures into physical models. This incorporates UI designs, data flow diagrams, entity relationship charts, user scenarios, and so on (Dennis *et al*., 2012). It comprises of the determination of the system architecture which incorporates a lot of physical processes, equipment, programming, individuals, and the communication channels that will fulfill the system's fundamental necessities. The plan is iterative all through the execution circle with complete client inclusion at each phase to empower human focused plans to finish and guide the entire procedure (Ghaffarian, 2011; Whitworth, 2009).

Agile technique is chosen since it guarantees appropriate coordination and straight forward communication among the individuals in the design team using task sheets and card systems. The most significant report in agile project is the release plan got from user stories, agile approach makes layman clients comprehend stories than specialized languages. Change management is the focal point of STS project, the project is both iterative and gradual, client participation in making tasks and time-box for every user story is fundamental for the accomplishment of the task. This assist the client to give information and settle on choices on the functions, quality, scope, requirements specifications, perform acceptance tests, and put comments on software release and changes that will or may happen during the project run. User groups are made to support this (Office of the Government Chief Information Officer, 2015). A milestone for each time-box is important to ensure that before each release, the clients have been happy with the result. Clients are required to be involved at each phase of production to guarantee that all client needs are negotiated throughout the project (Leitch and Warren, 2014).

(b) Post-Deployment Reviews

In this phase system evaluation and monitoring is conducted to understand how the system performs based on the expected outputs. The system performance can be measured using technical metrics such as mean time to failure (MTTF), mean time to recover (MTTR), integrity checks, security checks, and other technical measures. However, the question is how socio-technical elements such as attractiveness and user satisfaction can be measured? This can be done through provision of feedback forms, suggestion boxes and regular checks with the customers while interacting with the system. Asking the

customer a simple yet meaningful question:

• How did you find our services?
• Is there anything you feel should be improved?
• Have you ever experienced problems or difficulties using our system?
• How is the new system compared to the earlier?

Such open-ended questions provide end-users ability to produce useful feedback on the system performance. These questions can then be categorized and coded in a manner which the organization can understand and act.

DISCUSSION

It has been a tradition for most governments to impose strict rules and regulations to enforce compliance. However, this method proved to be inefficient because it requires a lot of manpower to implement and enforce the rules while not meeting revenue goals. Therefore, collection of revenues is enforced in soft sectors easy to control like telecommunication, energy, alcohol, corporate, imports, petroleum, vehicles, tobacco, and worker's income. Involving socio-technical concepts aims for all-inclusive technology/system, which ensures that all stakeholders participate in its design to ensure acceptability by users/clients (tax payers). This is because socio-technical concepts jump over the normal systems boundary and provide a broader system perspective to include a complete system environment while taking care of much finer details (i.e. social norms and human values).

Socio-technical concepts has brought in different disciplines in computing such as sociology, psychology, anthropology and ethics in the effort to study and understand human values in relation to computer science and/or software engineering. More research is required to effectively operationalize human values in computing.

CONCLUSIONS

This study has presented a pragmatic methodology in planning and advancement of open frameworks utilizing socio-technical ideas. It has shown that, designing a tax system using social-technical concepts can help to provide technical solutions which incorporates social aspects to address tax administration challenges, which includes, but not limited to, reducing tax burden to taxpayers by increasing tax base; reduce compliance time; reduce delays in tax assessments and audits, obtaining clarifications and responses to issues; overcome tax evasion and the need to increase tax rates.

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