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A Cloud-Integrated Framework for Efficient Government Financial Management and Unclaimed Asset Recovery

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Abstract: A Cloud-Integrated Framework for Efficient Government Financial Management and Unclaimed Asset Recovery abstract. The allocation and usage of government resources have always been a concern for citizens and practitioners. Over the years, various tools and frameworks have been developed to facilitate good government resource management. More recently governments have acquired and created data and information that can be used to analyze spending patterns and reveal hidden treasures such as unclaimed properties, abandoned warehouse sales, and unused accounts, which helps with efficient resource allocation. Additionally, governments can make use of new technologies, including data mining, data management, and cloud computing, to manage and monetize their data pool. This paper presents a framework that integrates various technologies and methods such as a data warehouse, cloud computing, interactive visualization, and data mining techniques to develop an information system that can be implemented by governments to facilitate financial management. Efficient and effective government financial management can direct resources toward projects that support growth and create welfare for citizens. In a world where every activity generates a digital asset, governments have access to and already possess a pool of data that offer opportunity to make more effective government decisions. This paper presents a cloud-integrated framework that combines new data management technologies, including a government cloud, interactive visualization, and data mining techniques, and creates an effective set of services, and presents a solution to the problem of inefficient government financial management. The proposed framework is applied to assist governments in monetary allocation decisions and provides a decision support system for both citizens and government decision makers. Through the proposed framework, governments can track where funds are employed within their organization and compare borrowed funds with allocated budgets, thereby enabling independent researchers to analyze how effectively specific funds are employed. This leads to the proposal of a service that could be designed on top of the framework to do unclaimed property analysis for citizens.

Keywords: Cloud Integration, Government Financial Management, Unclaimed Asset Recovery, Digital Framework, Public Sector Efficiency, Data Analytics, Asset Tracking, Financial Transparency, Cloud Computing, Fiscal Oversight, E-Governance, Automated Reconciliation, Real-Time Data Access, Centralized Systems, Financial Automation, Digital Transformation, Government Accountability, Recovery Systems, Public Resource Optimization, Cloud Infrastructure, Interagency Collaboration, Secure Data Storage, Digital Finance, Policy Enforcement, Intelligent Monitoring.

I. INTRODUCTION

Achieving efficient public financial management is not a purely technical issue. It also concerns the way governments and individuals arrange to accomplish planning, controlling, accounting, accountability, auditing and legislative reviewing of financial activities. The value of a public sector entity should not only be stated in monetary units, but also for its impact in community services and its commitment to the well being of the reported community. While local governments need to optimize the amount and the ordering of service levels, there are two important aspects they need to consider: (1) local community service priorities; and (2) available revenue sources for providing these services.

The analysis of the second aspect leads to the audit and recovery of unclaimed properties. Lots of time and bureaucracy is wasted in the linking process since asset owners may reside in regions different from those of their assets and also because the released information is not clear and objective. Increased effectiveness in the retrieval and recovery of these assets will also serve to refocus the attention of governments on the fact that there are properties that are rightfully of individuals. When these properties are integrated back with their owners, an important factor of trust in governments is restored as well as the relationship between them and individuals. Finally, the efficient management of this process will help prevent and/or facilitate the resolution of situations that cause individuals to persist in their unclaimed status. Brazil's situation is no different than the rest of the world. In addition to the challenges of worldwide cutbacks in government budgets and the fight against fraud, opportunities also abound. There is an increasing demand for more accountability and transparency in Governmental Financial Management not only in the fiscal area, but also in the non-fiscal area.

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II. BACKGROUND OF GOVERNMENT FINANCIAL MANAGEMENT

Since ancient times, governments have wielded extreme power over their citizens in terms of war, tax, and lawmaking. Their authority is unparalleled compared to any other institutions in society because of their monopoly on violence. This historical and institutional context differentiates GFM from that of the private sector. It also inherently ties GFM with public choices in society, including the public interest, democratic accountability, right and access to information, and freedom of speech and assembly. Before the enactment of modern accounting standards and law, it was virtually impossible to critically question the inflow and outflow of financial resources. Citizens could only access a limited amount of information, with little control over their usage.

Fig 1: Financial Management Definition

The implementation of double-entry bookkeeping by individual Italian merchants in the 14th Century launched the development of modern accounting, followed by the codifying principles of true and fair representation. Later developments in GFM in both Europe and North America also closely paralleled those in financial accounting. Compilation of GFM on a cash basis later arose to reflect all outflows of cash due to paying accruals during a fiscal period. By the early 1800s, GFM had also been made on the basis of cash receipts and disbursements to monitor the cash position of the state treasury. After the emergence of the modern public sector in the 1960s, GFM began to link the inflow and outflow of public resources with the outcome through a myriad of performance measures.

The significance of GFM stems from its necessary yet not sufficient relation to the provision of needed, if not desired, public goods by the government. Public goods may be in the form of physical goods, such as defense and infrastructure including bridges, as well as intangible services, such as education and health care. Citizens are usually not willing to pay the full price of public goods because of their indivisibility that allows them to free ride, thereby undermining the incentive to pay taxes. However, while the market supply for public goods does not exist or is highly asymmetric in nature, the government has the ability to levy taxes to ensure the provision of public goods in society.

2.1. Historical Context

The concepts of State finance and public debt developed along with the economic and political evolution of modern European states, first in Italy, then in France and England, during the fourteenth and seventeenth centuries. In Italian city-states, the need to fund wars for territorial conquest and to support military protection of merchant activities gave rise to the first public loans which were repayable through the imposition of taxes. The organization of public accounts was established in France and England where the monarchy reached full sovereignty and began to print paper money and implement compulsory loans. These measures allowed the English crown to finance wars and later the French crown to finance extravagant expenditure and wars with paper money and the tax on longevity. In France, special military tax collectors were banned from selling or retaining parts of public loans; in England, the abolition of the tax on longevity prevented the government from seizing deposited gold; but from the seventeenth century other methods of compulsory conquest emerged: characterized by high-interest rates and the requirement of specific privileges. Incessant public deficits originating from war, debt consolidation, and service costs marked the emergence, at the beginning of the modern state, of a process of financial autonomy destined to have a fundamental importance. Since then, the government's commitment on the financial market has been inexorably increasing; deepening the interconnection between the financial markets of the different countries and with that of the United States of America, through exchanges of securities, capitalization through public borrowings, and the issuing of bonds. At the same time, dependent on the evolution of the fiscal system, the tax burden on economies and societies has followed a process of accentuated upward progression.

2.2. Current Challenges

Unclaimed financial assets with governments may amount to sizable revenues and provide significant cumulative investment gains. However, digital accelerations and the automation of service delivery in the bigger private sector create contrasts toward the smaller public sector and more challenges to financial management in government. These differentials aggravate the aged perils of vested interests in the incapacity or reluctance of governments to recover holdings that financial institutions or businesses cannot or do not want to return to claimants.

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These present day-to-day tensions and ongoing frustrations in government transactions are compounding issues over economically-effective financial management systems, regulatory compliance with budgetary transparency, control and accountability, and costly areas of unsafe accounting, inadequate reconciliation processes, insufficient retention schedules and over-reliance on processes of low-risk financial management systems.

E-government service portals tend to reflect these same transactional problems of additional processing time, private-sector disparity and operational incoherence for positive claim outcomes. As with financial management systems, the citizen's experience and self-service, return on investment and data-driven performance measurement are important factors in considering the needed or wanted solution for e-government service portals. What are the benefits that the citizen expects from a positive transactional relationship with government? Why do citizens engage with the government sector? Do they want government to be as efficient as business, or are higher expectations to be met than for a solely transactional relationship? How do we recognize, respond and resource to the fact that some citizens prefer an improved, face-to-face, personal connection? Thus, integrated and whole-of-government strategies are required that build-in the capability for cross-rollover government-to-government and citizen-initiated transactions.

III. OVERVIEW OF UNCLAIMED ASSETS

This section provides a more detailed look at unclaimed assets. After defining unclaimed assets and detailing the various types of unclaimed assets, we go on to examine the respective legal frameworks, laws, and by-laws that govern them. The rest of the work revolves around the efficient management and optimization of residual unclaimed assets held by governments - to recover and administer them, to record and communicate the relevant financial information, to reward bedrock taxpayers and proper governmental financial management, and finally to generate ad hoc income and wealth redistribution policies at the national and regional levels. We also detail in our section 4 the narrative and critical aspect of our proposed solution to each recommendation point.

This Appendix provides some basic information about unclaimed assets aiming to clarify any lack of precision or accuracy. After carefully looking at various sources from both public and private institutions, we arrived at the following overview. Unclaimed property is any financial asset held by a government or financial institution on behalf of the asset holder that the holder has not claimed for a specified period. This typically means a tangible or intangible account, balance, or item from which no activity has taken place for a designated period amounting to seconds in normal interaction, years in the case of dormant accounts, or decades in the case of long-term assets. All of these assets can ultimately be turned to trust funds by the respective government agencies at the federal or local level. Unclaimed property is often held by private and commercial financial institutions such as banks, brokerages, and insurance companies, but governments also hold a number of unclaimed assets, such as securities, prizes, estates, or tax refunds.

3.1. Definition and Types of Unclaimed Assets

Unclaimed assets are property that has been abandoned by its owner or whose rightful owners could not be traced. Assets transform into unclaimed over the period of time prescribed by the statute with respect to underlying property. The duration of dormancy is referred to as the dormancy period. When a property becomes unclaimed by reason of dormancy, it is required to be recognized in the financial statements of organizations and other entities as a liability. At the same time, the legal title to the property is still held with the holders of the assets. On the lapse of ownership that is prescribed by the statute, it is required to reverse the liability and recognize revenue, and the underlying property is transferred to the unclaimed assets pool, which is earmarked for socially beneficial programs.

Eqn 1 : Total Value of Unclaimed Assets

$$UA_{total} = \sum_{i=1}^{n} V_i$$

- UA_{total}: Total unclaimed assets value
- V_i: Value of each unclaimed asset i
- n: Number of unclaimed asset records

It is important to note that the two broad meanings of term "unclaimed assets". In the narrower meaning, unclaimed assets are assets that cannot be availed by their respective owners, and whose value is often diminished. Examples are abandoned assets, and certain classes of dormant deposits. However, the broader meaning introduces an idea that is an unclaimed asset is a property that must be—at least periodically—recognized in the accounts of its holders and, on the lapse of ownership rights concerning it, is irrevocably transferred to the state. Consequently, the meaning of the term is

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not so much in its special process of establishing an asset as an unclaimed one. It is the consequences of the reclassification of asset that shall characterize it as an unclaimed asset.

3.2. Legal Framework Governing Unclaimed Assets

Worldwide, the legal framework governing abandoned or unclaimed property is different. In some countries, the government is vested with the rights of property. In others, title to the property remains with its original owner. Unclaimed assets come to the state in two ways: Either voluntarily handed over by the owner, such as in cases of tax returns; or involuntarily seized by the state after a lapse of time, for example, when no heir can be found for an estate, or the owner of a bank account cannot be traced for a specified period. The fate of the funds derives from the legal rule which, respectively, governs this return after a lapse of time.

If no rule exists, custodians who have temporarily taken care of the assets are not required to return them, but can keep such funds indefinitely. In such a case, these funds tend to be in a state of limbo in which their owner cannot assert the right of ownership and the custodian encroaches on the funds. The principles guiding unclaimed assets and their contents have long since gained acceptance at the international level, issuing from both scholars and deciding courts. In principle, all unclaimed deposits may be considered abandoned in the legal sense. In other words, these deposits, if not used over a certain period of time, no longer belong to the account holder; instead, they pass on to a third party, i.e., the government; or they are reverted and transferred to the bank maintaining the account. Furthermore, the demarcation between unclaimed or abandoned deposits and escheatage, according to which property devolves upon the state, is to be viewed as an international common principle.

IV. CLOUD COMPUTING IN FINANCIAL MANAGEMENT

Cloud adoption has been growing fast since 2009, with companies' migration to it for various information technology activities, both mission and business support related. More recently, such services have become attractive also to governmental organizations. In particular, financial management systems are facing the challenges posed by the growing complexity of governments and their businesses, both internal and external, from the local to the international level. Cloud computing is an alternative for financial management systems aiming to higher efficiency and keeping up with changes in both technology and business processes. Traditionally, financial management, as almost any internal support activity performed by a governmental organization, faced the problem of contributing to maintaining the operations in an easy and non-expensive way. These objectives often conflicted with the adequate use of technology to enhance operations. Cloud computing offers an alternative, allowing its users to take advantage of the newest technologies and a reduced cost. It will help building a less hierarchical culture, focused on the motivation of the workforce and on the usage of technology, as opposed to the traditional costly structures that only reproduce negligence, bureaucracies, and lack of trust. Cloud services will promote disintermediation, automating and making more efficient a number of management functions, especially if these functions are also performed by external actors, and by promoting sharing services focused on efficiency and cost reduction.

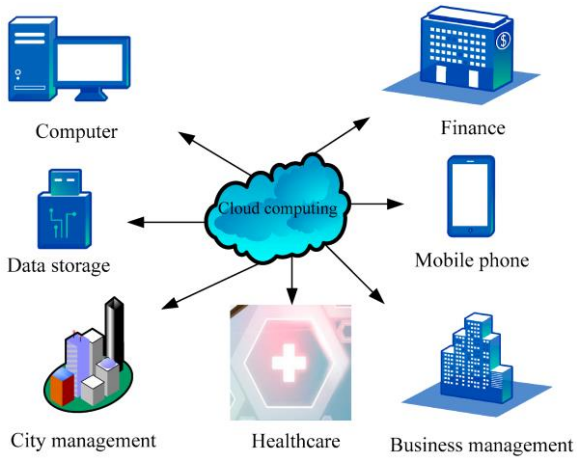

Fig 2: Enterprise Digital Management

4.1. Benefits of Cloud Integration

Cloud computing has recently gained a lot of attention. It has the potential to greatly affect every aspect of public sector performance. This is partly because of its ability to greatly decrease the barrier to entry for new, more agile cloud-enabled governments. However, cloud computing also has implications for existing public sector organizations. In combination

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with the use of social media and other emerging technology tools, the cloud can help existing public services become more authentic and more citizen-led in their design and delivery. The cloud enables open data - real-time insight into public sector performance, and third-party re-intermediation of services around government APIs. Financial management is an indispensable part of any infrastructure as it performs the function of rolling out any major project in the future. Financial statements are a representation of the financial position and performance of an organization. By utilizing cloud computing in financial management, these statements can be prepared in an efficient manner. Computationally intensive operations can be taken care of at the backend, while a thin client can present interactive visualizations of financial statements.

Eqn 2: Operational Efficiency Gain

$$OE = \frac{T_{old} - T_{cloud}}{T_{old}} \times 100$$

- OE: Operational Efficiency (%)
- T_{old}: Time to complete tasks before cloud adoption
- T_{cloud}: Time with cloud-enabled workflows

Cloud computing has many benefits to offer to financial management. The performance level is high because of following features: Self-Service: The organizations do not need any IT development resources. The system is ready to use within a very short time. The development and launch cycles are very short, highlighting the adaptability of the system. The organizations demand the storage and service without planning to put heavy amounts in the infrastructure. The organizations get the access of database of transaction sharing from different systems in order to divert the resources. Financial sector infrastructure becomes inexpensive due to less investment in storage and server hardware.

4.2. Risks and Considerations

Cloud integration for financial purposes is a complicated decision. Financial data contains agency bank account information, payroll information, and other confidential and sensitive information including Social Security numbers, home addresses, and medical data. These all contain risks for data breaches. Federal, state, and even local agencies all have their own regulations for maintaining confidentiality and security of data and for compliance purposes. However, they may not all approach compliance the same way. Cloud integration contracts between cloud providers and agencies need to be customized to ensure that the agency addresses the legal standards required in its jurisdiction. This may escalate the cost of cloud services to cover the cost of data protection and prevent liability and penalties. Cloud service providers are still legally responsible for complying with standards to protect federal data. Unless the agency has a custom service level agreement with the cloud providers, ensuring compliance may become questionable. Lastly, the records may also need to be maintained in certain places for regulatory or audit purposes. Simple convenience may not be valid decisions, especially if records are needed during declared emergencies. These may also have cost considerations and may need to be added to the cost of cloud services.

This is especially of importance for agencies that may not utilize all of the cloud capabilities and may not fully understand the cloud-based technology. States that just recently transitioned to cloud-based systems may not be able to enjoy the benefits of cloud computing until they have resolved these issues. In these instances, cloud computing does not lend itself efficiently for state financial management solutions. States must recognize the risks involved with cloud integration for sensitive financial data and clearly define their regulations. Local agencies also need to recognize that compliance may not be covered by the service level agreements.

Fig 3: 4-Step Risk Management Process

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V. FRAMEWORK DESIGN

In logic, a framework is a structure that provides a foundation. Similarly, a framework for government financial management provides the structure and mechanisms for facilitating the transaction processes of all stakeholders, especially the government and the citizens. The framework proposed provides efficient cloud-based frameworks for government financial management and citizen services. It is a cloud-integrated framework built upon an upper layer of cloud-computing technology and a lower layer of the government financial system infrastructure. In this framework, the lower layer provides a solid base for data storage and secure transmission. The top layer consists of various tools and service portals designed for administrators and citizens. The two layers are integrated by integrating available APIs. The design and integration of both the lower layer and the upper layer are presented in this section.

On the upper cloud layer, various portals and tools are available for producing and presenting reports, managing notifications, administrating citizen tracking, and allowing submission of retrieval requests or complaints. Citizens can view their trophies with a detailed description and related information to the underlying data source. Verified citizens can take online retrieval actions. Notifications of retrieval progress and reminders are sent to citizens. Both citizens and administrators can submit inquiries or complaints from the portals about the status of either a specific trophy or all trophies of a specific type which are unclaimed to the date they submit the inquiries or complaints, and to the date they receive the reply. The architecture of the proposed cybersecurity architecture is shown.

5.1. Architecture of the Framework

In this section, we detail the layer-by-layer architecture of our cloud-integrated framework – centered on a cloud-based data storage and sharing layer, which powers a unified services layer that integrates e-government services relevant to financial management and unclaimed asset recovery. This layered architecture serves to unify and integrate diverse data and services, thereby supporting the automation of otherwise highly manual business processes associated with government financial management and the recovery of unclaimed assets. Our proposed framework supports data storage and sharing through a cloud-based data layer. Key data relevant to government financial management, including citizen and business registries, are stored in a standardized way in a centralized repository hosted on the cloud by government agencies. This repository is accessible to citizen services and financial management services through a unified services layer. This layer integrates citizen services – including e-tax services, e-business services, and e-payment services – that are aligned with the periodic life-cycle events that occur for both citizens and businesses into a single portal.

The unified services layer, along with the cloud-based resources on which it sits, also support the integration of e-government services relevant to recovery of unclaimed assets. Stripped bare of redundancy, duplicated effort, and data sharing friction, our proposed framework allows government agencies – ranging from those managing social security benefits, pension funds, banks and insurance agencies, taxation, trade, commerce, and businesses to financial services regulators and consumer services agencies, and e-government service providers – to internally generate operational synergies and savings while sharing resources externally with other agencies in the public value chain.
The consolidation and integration of their operations, spurred by requirements of a central cloud data layer, ensures that, with respect to recovery and reunification of unclaimed assets, no one agency's function is performed to a partial exclusion of the others.

Eqn 3: Modular System Architecture Equation

$$M = \sum_{i=1}^{n} C_i$$

- M: Total system architecture (modular design)
- C_i: Component or module i
- n: Number of modules in the framework

5.2. Key Components

The framework is organized into four fundamental components: the Economic Engine, financial information exchange services, the Information Bus, and the Registry Services. The structure of the framework focuses on exchanging and sharing semantic and syntactic financial data, as well as information regarding the nature and ontological relationships of these data. This information is crucial for different organizations or agencies to return a value and to retrieve the appropriate data that conform to their specific local fiscal regulations and the template of their internal systems, which can be different semantically and syntactically or both. Also, the reliability, confidentiality, and security of this exchange are paramount as financial databases may contain private asset information of citizens.

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The Economic Engine is essentially the software component that implements the economy of a country or government based on ontological equations. It cooperates closely with various government organizations to be provided with the new tax laws so that tax returns created by individual citizens or legal entities store the correct information according to the local regulations. Also, the Economic Engine processes annually the expense budget of each government organization, as well as the budgets and financial statements of social security funds, and receives their implementation statements. These data, concerning income and costs versus revenue, are differentiated between overtime and last month of the year. The implementation of international and local guidelines on economic government consolidation must also be taken into account and fully automated.

VI. DATA MANAGEMENT STRATEGIES

The integration of technology into our daily lives is evident, as a significant portion of our routines now relies on technology. Besides the convenience it brings, its application in a government context can improve both accuracy and quality, as well as the speed of decisions that are made. Repetitive tasks, such as searching for and verifying unpaid government obligations, are often delayed or ignored due to a lack of time or resources. However, task delegation to an automated digital environment can allow a cloud-based architecture to help meet accounting deadlines or obligations, thereby reducing errors through automated data collection and verification. Consequentially, resources can be focused on other important tasks that require critical thought and evaluation while the digital assistant searches for unpaid obligations and assesses any reporting risk related to missing data. This paper proposes a cloud-integrated digital assistant that would use multiple data collation and analytical methodologies to determine if unpaid accounts exist and flag them for further investigation.

Fig 4: Data Strategy Framework

Cloud storage provides a method for keeping multiple large data sets stored relatively inexpensively, eliminating the need for higher capital investments, while simultaneously providing data security. Security is handled on the back end, and from a software development viewpoint, there would be a need to identify and create a secure software environment as this would be where the cloud digital assistance lives. Information in the cloud could remain encrypted until needed so that it remains secure. Because the system would be working with sensitive financial data from multiple states on a continuous basis, data security and user privacy would be paramount, and validations of software users would need to be determined. These procedures would collaborate with both government budgets and state customs.

6.1. Data Collection and Storage

Public financial management data are generated through a number of interrelated and sequential activities directed toward the collection, storage, processing, use, and disclosure of PFM-transactions data in a timely, accurate, complete, and cost-effective manner. These activities can generally be classified into broad categories. By tracking the flow of financial data from the point of collection to its storage and processing and its ultimate use and disclosure, the financial data management process establishes an essential framework for the analysis of PFM data. This section focuses on the activities associated with managing PFM data, from their collection, to their storage in PFM databases, which are accessed by other systems for processing purposes, to their provision to users. Government agencies are increasingly using cloud solutions to process, store, and transfer financial data. These cloud solutions offer several advantages over conventional systems, including the ability to reduce initial investments and ongoing operating costs, make technology resources and applications more readily available, improve the quality of services provided, make use of innovative platforms, and increase the accessibility of systems and applications. Cloud security mechanisms ensure protection against unauthorized access and secure the data that are transferred to and from it.

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With most of the improvements in the confidentiality required and the integrity of the data, and with the mechanisms of data encryption, it is possible to have substantial benefits from cloud computing for storing and multiple other applications in routine use.

6.2. Data Security and Privacy

The implementation of the PaaS module for government financial management and unclaimed asset recovery and transfer shall require a number of protocols to enforce data security and privacy, mainly due to the potential sensitivity of the information it handles, enforced by statute, ranging from governance and general economic data to information on individual citizens and their financial interactions with the country, such as tax return information, bank account and asset records, identification records, and unauthorized transactions. Data security is essential to preventing unauthorized access to sensitive data, such as state operational and financial information, public responses, and taxpayer information. Data privacy, or confidentiality, is equally important because government databases contain confidential information that is often very sensitive. The general rules pertaining to data security and privacy shall be defined through amendments to the relevant communications laws and specifically the government's and citizens' roles and responsibilities for protecting data during its life cycle, from collection to storage and transfer. These rules shall detail the data security and privacy policies for any transactions until declared obsolete. The government shall implement these rules primarily through the PaaS module for government financial management and unclaimed asset recovery and transfer, including suitable encryption mechanisms, data handling and storage encryption, key management, trusted time-stamping, and transfer. Security requirements during development of the PaaS module shall include design of security architecture, secure programming rules, and review and testing provisions. The government may additionally request and pay other parties to audit the provisions for protecting the data for conformity with the relevant policies, including any additional regulations and conditions specified by the government.

VII. IMPLEMENTATION STRATEGIES

The proposed framework is targeted for federal governments and their various tiers of agencies. Therefore, we also realize that the design and implementation of such comprehensive technology-based system can be disruptive to business as usual due to the breadth and depth the system covers. This problem is compounded as different countries have different legislation governing their financial systems and how their agencies report and account for their unique cash and non-cash financial assets. Hence, we propose a phased and discreetly tailored solution approach for the realization of the proposed framework. Following this approach, the Digital Toolbox is designed to have the following unique features. It enables the graduated addition of plug-and-play tools or modules for different non-cash asset and cash and asset type-specific policy objectives and strategies. It also provides a Rapid Prototyping Development environment where a trial mode is available for validation of tools and R&D on enabling regulations. It employs an intuitive Low-Code capability for development of additional tools and modules, thus enabling ready adaptation and adoption of the Digital Toolbox for diverse country implementations. It allows for scaling of the Digital Toolbox as an entire government eco-system.

Specifically, for the implementation of the Digital Treasury, beginning with a pilot implementation by a tier-one ministry, given the importance of the treasury function on implementing budget allocation control, monitoring, and reporting, is proposed. A graduated deployment to all tier-one agencies, then all tier-two ministries and agencies, and subsequently to selected cash and non-cash asset specific budget executing line agencies is envisaged. For subsequent deployment of Agency Systems, it will follow that of the Digital Treasury's gradual rollout plan. Thereafter, the schedule for different Non-Cash driven Assets will be collaborated with the latter's Asset and Property Agencies, taking into account their unique business environment.

7.1. Phased Implementation Approach

Discoveries are borne out of problems; innovative solutions are created, which fuel advancements in technology, scholarship, and society at large. The Government of Bangladesh has faced multiple challenges in its contemporary digitalization efforts directed towards improved public service delivery. These obstacles, which extend across other national systems, remain unaddressed and therefore Australians have not been able to leverage the full benefit of resource-rich national processing systems. Blending best practice with practical experience derived from achievements to date, we offer a multi-stage phased approach to implement a Flexible Government Application Programming Interface Gateway for select government financial management functions moving towards a Cloud Integrated Framework that underscores the proposed Unclaimed Asset Recovery and Utilization Model. Recognizing that this notional FGAPIG remains but a single facet of a national processing architecture that remains decidedly underdeveloped, might we suggest the gradual FGAPIG implementation phases outlined in this section.

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Fig 5: INSIGHTS: The Guthrie-Jensen Blog Top Project Management Approaches Explained

Our approach is predicated on a shoulders-to-the-wheel strategy that appreciates current Bangladesh government financial management functionality for fiscal data collection and processing but taps innovative technology-enabled solutions for deliverable-enhancement moving forward. The first phase creation effort anticipates the task of electronically filing and processing government fiscal operations through the establishment of a standardized bare-basic electronic data format. Upon completion, each daily deposit of all bank-conducted government revenue transactions funded via the assigned government revenue account(s) will need to be notified to the Office of the Controller General of Accounts and validated by the Office of the Treasurer General with increased efficiency and speed. The online process would be equally utilized for electronically issuing revenue collection notifications by the Controller General of Accounts with validation by the Treasurer General.

7.2. Stakeholder Engagement

Throughout the stakeholder engagement process, it is critical to identify and involve the right stakeholders; understand their interests, objectives, and motives; clarify decisions that will require their buy-in; and make a good-faith effort to communicate in ways that respond to their needs. The strategy for stakeholder engagement must also encompass considerations related to the timing of outreach, available channels for communication, and resources needed for stakeholder engagement.

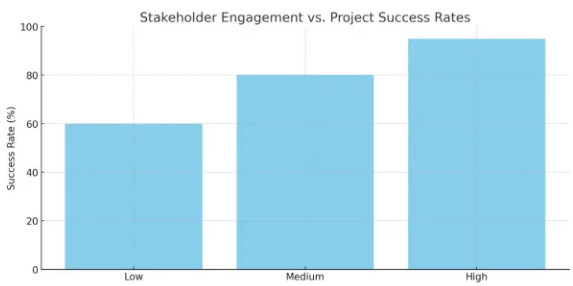

Fig: The Role of Stakeholder Engagement in Sustainability

While these considerations will vary for different stakeholders, they may include, for example, the types of funding provided to particular stakeholders, their level of control over decisions, the time horizon of their investments related to the system, potential exposure to risk or liability in the event that something goes wrong, their general interest in stakeholder engagement, and their current connection to the sponsoring organization. It is also advantageous to identify and incorporate the views of stakeholders with whom the sponsoring organization may not currently have an ongoing relationship but who could support the future sustainability of the integrated digital finance asset recovery system. For instance, institutions such as consultancy agencies, strategy-formation firms, and think-tanks that assist in the formation and decisions of the country regarding digital finance policies and strategies could be valuable partners throughout the stakeholder engagement process because they influence and help formulate decisions that can become vital for the establishment of the decentralized finance environment in a country. Engaging experts from such organizations may thus facilitate access to information and knowledge-sharing resources on the topic of digital finance and the establishment of strategies for the integration of decentralized digital systems such as a digital finance asset recovery system.

VIII. CASE STUDIES

We present four very distinct but highly relevant case studies that illustrate the challenges of government financial management. The first is a success story of a country on a positive path towards financial integration showing what can be done when the political will is present.

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The second highlights implementation challenges for a possibly overheated country under pressure. The third details obstacles of three disparate Revenue Authorities of a multi-country union. The last is an example of the far-reaching impact of weak tax collection due to inadequate resources and organization.

Estonia has the most modern e-government in the world. Its entire citizen registry is electronic, all communication between people and government is online. Its e-Tax system is such a success that 90% of income tax returns are done online with pre-filled return just awaiting final confirmation, with only 10% needing personal assistance from tax officials. These returns are processed automatically and about 80% of refunds are issued within 24 hours. It has not only integrated its government tax collection system, but its Social Insurance and various city councils tax collection systems into a single eTax. Since the Estonian Revenue invests heavily in developing their eServices and making it as easy as possible for taxpayers to comply, they have been outsourcing them to a private company, who developed it to look and function like a bank's online banking service.

Three years after Estonian e-Tax was launched, neighboring Latvia launched a similar e-system. A more recent survey showed that, while only 0.5% of Estonians had not yet used online banking, the percentage in Latvia was still 13%! Estonia was ready for the transition, Latvia was not. There are important lessons to be learned from both systems for other countries considering the Internet Banking transition. Latvia followed the template established by Estonia, but did not have the same political will and commitment and paid the consequences of having delayed addressing necessary organizational reforms, infrastructure investments and maintenance.

8.1. Successful Implementations

The integration of blockchain technology within government financial systems is predicted to positively transform activities including digital asset sharing, government spending, tax collection, disaster settlement, and food security. A popular cryptocurrency exchange collaborated with a technology firm to perform research and development and to develop a blockchain-based tech solution that improves the efficiency of government financial management. Funding was provided for the research. The project is a hybrid coin-based on a second-layer eco-chain. The investment strategy encourages innovative and technology-oriented firms to develop new businesses. Decision-makers and government executives have become interested in Web 3.0 and the metaverse. The collaboration indicates that financial institutions and government entities play an important role in popularizing blockchain applications.

A region in the Asia Pacific was the first to implement a tokenized central bank digital currency pilot program to facilitate payment settlement in the digital asset. An area planning council implemented an unclaimed property blockchain-based service system for digitizing and tokenizing fallen property to minimize the processing time for unclaimed property financial management. In the system, the property transfer process also uses reputation tokens to evaluate registered reclaimers and unclaimed property holders and adopts a reputation system that plays an important role in the effective governance of blockchain applications. Therefore, the system bridges the gap in trust building among different trust levels of market players involving digital property exchanges and transactions. In addition, it also implements the tokenized version of the property.

8.2. Lessons Learned

Given the cloud-enhanced efficiencies, capabilities, and low costs of the Cloud-Integrated Framework, an entire new class of solutions and technologies for government financial management and unclaimed asset discovery and recovery can arise. However, there are many important lessons learned from existing implementations of successful versions of such solutions. There will be no cloud enhancements to these solutions in the near term because technical integration into the cloud commercial infrastructures is nontrivial, and burdensome because it has to be done in compliant ways that are not sustainable in the long-term. Given the fundamental similarities of the initial solution offerings and the solutions to IT application sectors found in the commercial setting from which they were drawn, we can apply the lessons from that commercial sector to enhance the future government offerings.

Both the commercial and government offerings must start somewhere, and the earlier implementations may not be the best or most efficient or secure or lower cost solutions available. Lessons learned from those earlier efforts can improve future solutions in terms of technical, business, and operational efficiencies, costs, and effectiveness. The continued collaboration between the applicable sectors will also enhance the solutions and their contributions. Those lessons are that low cost and sufficient technology is available today to implement a modern cloud solution, dependent upon optimal partnerships, engaging a strong, talented, stable work force to deliver, install, maintain, and operate the cloud solutions, but unwillingness to commit resources to ownership requires careful management to ensure a successful deployment and transition.

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Frequent disruptions to management and the system architecture make it more difficult for these solutions to deliver on expectations that they can be delivered quickly in time for elections, with the highest levels of IT security and reliability, to provide long-term monitoring and management of the cloud services and the communications between enterprise and cloud. Implementing such a solution is only the first set of the steps down the digital path.

IX. IMPACT ASSESSMENT

As detailed in earlier sections, the operationalization of the proposed PA-FM-CA-MRM is dependent on the national and state cloud computing implementation strategies. To estimate the full impact of the proposed framework, we will present illustrative computations for both the proposed framework as well as the identified enabling architectures upon which they are dependent. This would allow a more thorough grounding of the benefits, costs and risks associated with the proposed work, and should therefore be of distinct use to key stakeholder groups by helping them plan for both the sequencing of the architectures identified and the functional modules that will benefit maximum from the deployment of cloud enabled PA-FM-CA-MRM. These will not only be applicable to the entire state accounting framework, but will also help assess the impact, by quantifying the unclaimed asset recovery work.

The need for framing a policy for centralized asset management is bolstered by an assessment of the benefits per fiscal year by centralizing events associated with centralization. We begin our impact assessment by estimating the efficiency gains from implementing the proposed accounting architecture such as the intangibles policy capturing the established savings in forensic capability based on the independent commission on the budget proposes to turn external research into real savings or enhanced tax compliance modeling capability based on the macroeconomic model of requirements from national revenue development and estimated levels from using the proposed co-design of an integrated PA strategy on management activities. The cost estimates are crucial in order to provide a clear picture of direct costs such as capital investments in infrastructure and IT investment decision cycles or estimating the establishment costs from policy decisions from screening offers. The next natural question to explore is how far the proposal is likely to assist unclaimed funds policy economic efficiency goals over which budgeting of city or state governments has some scope of influence.

9.1. Measuring Efficiency Gains

Efficiency has been traditionally denoted by the term ‘doing things right’. Early work by economists speaks about owning and using resources to complete different activities at the minimum possible cost. This application of the principle of optimization equates efficiency with the achievement of a ratio of output to cost as small as possible. Not surprisingly, the resource-consuming activities that governments abound, are rarely subjected to efficiency analysis. This is particularly true of UAR and related activities.

Excluding normative readings, the econometric studies that specifically deal with the measurement of efficiency – and often propose across-country rankings – have used data envelopment analysis or econometric frontier techniques. The analytical underpinnings of these empirics rely on the quantitative estimation of a production or cost function that use various ratios of the output to corresponding costs as the dependent variable, and other relevant ratios controlling for scale or structural effects, as independent variables: that is the ratio of outputs to costs that would occur at the optimum level, ceteris paribus, is regressed against other relevant ratios, thus allowing one to infer the level of efficiency.
However, serious doubt arises about whether the cross-country comparisons that such models are able to provide capture what has been defined above as efficiency. Indeed, the prime merit of comparative studies is to offer a cross-sectional snapshot, not of how comparators have arrived at such levels of efficiency, but whether the conditions for such a crossing of the ratios of output to cost in the near future is ensured.

Growth accounting measures of efficiency may draw on a ratio, which has entered productivity analyses as the empirical analogue of the neoclassical theory of competitive equilibrium. This ratio is the ratio of the market value of a firm to the replacement costs of its assets.

9.2. Evaluating Unclaimed Asset Recovery

9.2. Evaluating Unclaimed Asset Recovery Social welfare, understood as the set of essential needs of society, must be maximized. It is usually understood, at least for public policy planning purposes, that this is achieved and expressed by the maximization of its constituent parts, that is, of the individual utility functions. More recently, this property is also assumed for the families, groups, and other social units for which the different levels of the hierarchy of public actions are aimed. Therefore, the definition of the objective function of policy analysis becomes, in a nutshell, the summation of the different members constituting the whole of social welfare. At the individual private level, utility is defined as the improvement, expressed in a monetary equivalent, of situations in the presence of risk. The functions of public action at the micro level restore the "externalities" produced by individual credits, transferring the amounts received.

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The recovery of unclaimed assets, especially in the face of the current social emergency due to the pandemic, has a dual effect on social welfare. On the one hand, it redistributes resources in favor of groups and families that face precarious living conditions. At the same time, it provides additional funds for public policies aimed at addressing the social crisis. These two properties of unclaimed resource recovery are generally well-known and theoretically accepted. The instrument of the budget identifies the state as the ultimate responsible for balancing the rights and duties of the citizens in being as equal as possible. State intervention is intended to fill in the social deviations detected through the collection of fewer unclaimed financial resources than that assumed as basic criterion. In policy planning, however, the properties offered by Stage 1 must be complemented with suggestions such as the possible existence of perverse effects.

X. FUTURE DIRECTIONS

This chapter concludes with a perspective on future directions for research and practice. We suggest two areas that show considerable merit, and have the potential to substantially amplify the impact of public finance policy. The first relates to the application of emerging technologies, particularly artificial intelligence. AI is advancing at a rapid pace. With continued investment, and careful embrace of the technology, it will someday be available for public financial management on the cloud. This holds the thrilling prospect of generating substantial efficiency gains, freeing scarce specialist practitioner time for high value-add work. We outline a roadmap for how this might be done.

Second, we offer suggestions for how popular support might be cultivated for a more practical approach to policy formulation, more closely linking what the state does to the values and aspirations of the public. State financial management, particularly in the areas of benefit payment and unclaimed asset recovery, is large both in scale and importance, carrying great political risk if challenges occur. Progressively, however, the experience of citizens when penetrating the public sector barriers intending to access the services that they, collectively, have paid for, and the unequal treatment where life circumstances differ, are becoming more visible. Making loss recovery easier, so that recourse to welfare when in times bad is made once again more acceptable, is a common goal. Carefully combined within a policy coordination framework, AI and public support could facilitate a handled service experience, simultaneously making efficiency savings and political capital.

10.1. Emerging Technologies

A number of emerging internet-based technologies, like Blockchain, would not just help in policy enforcement during asset recovery process but also make these processes more efficient and transparent. Such technologies also empower individuals to recover their due possessions and rights. Use of Digital Currency for Government Payments by Citizens: Amidst ever-present concerns of corruption in Government payments to parties and merchants, Governments have been increasing labor costs to put in place large support control and inspection mechanisms to ensure that the citizens receive the benefits. The control mechanisms increase costs of doing business for the Government and fall prey to corruption at the same time. Digital currency, linked to a citizen's wallet, can facilitate seamless transfer of funds, thereby removing the middle-men and associated costs. Payments for services using digital currencies during specific timeframes can streamline the processes. Recovering Unclaimed Assets through Blockchain: All nations have been trying to recover their pending use-able tangible fixed assets.

Blockchain can help put unclaimed assets in one ledger that sectors, regions, cities, companies can tap to retire their respective liabilities or use only after a time period, during which the rightful owners don't show intent to recover. Diaspora can also be connected to their homeland so that they can try to recover unclaimed lands or ease the process of their transition from unclaimed to claimed assets. Tokens can be created for each prolonged unclaimed assets, against which, local populace, diaspora, and the government can bid for physiographic transition. The locals would be able to pay the least cost to either government, or owner, or both while reclaiming the property thereby being able to use it for the government, state, or both while taking the ownership back.

10.2. Policy Recommendations

With the evident digital transformation around the world, any entity, for-profit or not, needs to understand how they can leverage new technologies to provide increased services for their stakeholders, all while decreasing service times and costs. The world is changing, and we must look for those companies and entities that can come up with new ideas regarding how to apply and use the latest and greatest technologies in their core competencies. Therefore, government agencies worldwide should work to become digital creators, and not adopters, with original ideas on how to leverage actually existing technologies and ways to make available good quality open-data services, that allow their stakeholders to have the best possible experience and performance. Government entities should define how a multilevel structure of open-data services, integrated with external actors, whether profit seekers or not, can impact the interactions that all businesses and citizens have with the government, through interfaces always working to enhance the overall experience.

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This coordinated effort must be built around what the government is really good at, which is sport complex design, creating the rules and incentive systems, and providing the services, data, and tools to help the market produce for the citizen's welfare.

An important first step to make this a reality is to try and create a shared multilevel architecture of cloud-based services that put all unclaimed assets related data in the cloud in real-time for all legitimate businesses interested in this segment to process it. In this enabling environment, the different government jurisdictions must be committed to provide a steady flow of accurate and qualified data, and private businesses must comply with making the proper checks on their data processing, in the respective cloud, allowing qualified parties to take advantage of the services they can provide. This multilevel structure must include not only the governments but also the autonomous agencies responsible for the timely and accurate provision of related data.

XI. CONCLUSION

Government financial management is critical for the achievement of profitable economic growth and welfare enhancement. Efficiently managing public debt, deficits, and revenues, as well as effectively carrying out public expenditures and policies, are key components of government financial management systems that matter in government development strategies. Unfortunately, government finance systems are globally afflicted by a lack of interconnectivity within and between sub-sectors and stakeholders. This lack exacerbates information asymmetries, which breed inefficiencies, errors, opportunisms, and subsequent economic losses. In this regard, the management of unclaimed assets is particularly exposed, as the key actors rarely communicate or refrain from benefiting from the financial data they can leverage.

This paper proposes a cloud-integrated financial information framework that performs vertical and horizontal integration of fragmented government financial processes within and between sub-sectors and actors, leading to co-created real-time public account balances. By proposing information co-creation and an efficient risk management process as the sources of information efficiency, we suggest that an efficient management of unclaimed asset recovery as monetary government revenue can lead to the efficient development of government financial management. Alongside enhancing stakeholder engagement, promoting budget disciplines and safeguarding controls, these features answer the demands of the stewardship and value for money models of public finance accountability and monitoring. These elements are very important in an era equivalent to the beginning of the second industrial revolution, affected by the abrupt advent of the well-established digital revolution, applicable beyond traditional monetary features of budget balance and economic growth. The evolution, evaluation and possible integration of artificial intelligence within the proposed framework are certainly areas of future research to look forward to.

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