

Governing Web 2.0 Adoption in Public Sector in Emirates of Abu Dhabi, UAE

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Summary

Enterprise Information Technology (IT) has become critical in supporting business sustainability and growth. Emerging Web 2.0 technologies contribute significantly to the fulfillment of key organizational goals and objectives in the public sector. Web 2.0 assist organizations improve employee's productivity, increase communications, information sharing, and improve business processes. The pervasive use of Web 2.0 has created a critical need for effective IT governance procedures. Therefore, investigating Web 2.0 adoption decisions in public organizations is important. Adoption of Web 2.0 entails specifying a framework for Web 2.0 adoption decision accountability, identifying implementation factors and portraying the governance framework of Web 2.0 adoption in the lights of organizational policies, procedures, guidelines and existing organizational IT governance framework.

Key words:

IT Governance, Web 2.0, Adoption Frameworks, Wiki, Blogs.

1. Introduction

Governance has a number of meanings that are all related to control and authority [2,3]. IT governance is used for focusing on information technology systems' performance and managing various risks. It refers to organization's ability to manage and control the implementation and arrangement of IT strategy with different directions to achieve the corporation competitive advantage [2,3]. Weill, P. and Ross, J. at CISR [4,5] defined IT governance as specifying a framework for decision rights and accountabilities for important IT decisions. It is about determining who has the decision right and who has the input right. Moreover, IT governance goal is to encourage desirable behaviors in the use of IT and it is helpful in making organizational line invisible to customers. However, it can't be considered in isolation because it links to other key enterprises assets governance such as human, financial, and intellectual property [4,5].

Emersion of web 2.0 technologies provided competitive opportunities for enterprises in different businesses process and activities. Adoption of web 2.0 technologies in enterprises is enhancing the business communication way with employees, customers, and suppliers. Moreover, it increases business efficiency, and provides various collaboration tools, meeting space, services portal, and

media sharing [1]. Business leaders who adopt web 2.0 technologies and applications are looking for application development professionals to help them in improving employees productivity and enhancing business process. However, adopting web 2.0 technologies requires a specific organizational framework for adoption and a specific IT governance framework to be followed which can be called Web 2.0 adoption governance. According to IT governance definition, which is specifying a framework for decision rights and accountability for Important IT decisions [4,5], adoption of Web 2.0 technology requires specifying a framework for accountabilities of web 2.0 adoption decision and identifications of implementation factors.

This paper will focus in answering the following research questions:

RQ-1: What are the main successful models and frameworks for corporate IT governance?

RQ-2: What are the main Web 2.0 adoption frameworks?

RQ-3: How Web 2.0 technologies can be used to govern corporate process?

RQ-4: How Web 2.0 technologies can be adopted in enterprises?

In section 2 we introduce IT governance in the literature and its main theoretical frameworks. Section 3 introduces Web 2.0 and its main services. Section 4 includes Web 2.0 challenges in enterprise deployment. In section 5 we introduce several current web 2.0 adoption theoretical frameworks. Section 6 includes a comparison between the discussed web 2.0 adoption frameworks. In section 7 we introduce our proposed hybrid Web 2.0 adoption governance framework. Section 8 includes our research structure and methodology description. In Section 9 we include a brief overview of our case study. In section 10 discussions and recommendations have been discussed. Section 11 is concluding and mentioning our observations, it includes some open issues and future works that weren't covered and summarizing research limitations.

2. IT Governance and its Frameworks

IT is a critical function for supporting and facilitating enterprise objectives. Governance reflects the organizational structures, leadership and processes that extends organization's strategies and ensures IT sustainability. Successful IT governance leads to real business benefits that enhance stakeholders' values such as reputation enhancements, product/market leadership, reduced costs and trust [2,3].

Weill, P. and Ross, J. [4,5] defined IT governance as specifying a framework for decision rights and accountabilities for important IT decisions. It is about determining who is responsible in making each type of decision "decision right" and who has the right to input into a decision "input right". Moreover, IT governance goal is to encourage desirable behaviours in the use of IT and it is helpful in making organizational line invisible to customers. However, it can't be considered in isolation because it links to other key enterprises assets governance such as human, financial, and intellectual property. There are many different IT governance frameworks that assist enterprises in decision making and controlling business process; those frameworks varies in their features, uses, benefits, requirements and quality. Grembergen defined it as the organizational capacity exercised by the board, executive management and IT management to control the formulation and implementation of IT strategy and in this way ensure the fusion of business and IT [69]. In contrast, Luftman [70] described IT governance as the selection and use of relationships such as strategic alliances or joint ventures to obtain key IT competencies. In this section, some of the main IT Governance frameworks are presented.

2.1 Conceptual Corporate Governance Model

Raghupathi, W. [3] proposed a model that consists of three main stages. Stage 1 highlights routine procedures and policies for internal activities such as employee privacy, security, emails, and data handling. In stage 2, an expansion occurs from internal policies and procedures to partnerships and interactions with alliances, suppliers and customers. Stage 3 involves extending best practices to the industry including the public as well.

Moreover, Raghupathi, W. [3] proposed a grid framework which consists of four quadrants that represents an interaction between two main dimensions of IT governance and sub-dimensions which are focus (operational, strategic) and driver (internal, external). The first quadrant which is internal/operational focuses on routine policies and procedures that most organizations must implement. In the second quadrant, internal/strategic expand the governance to policies affecting the overall organizations' performance. External/operational which is

the third quadrant involves covering governance policies in terms of customer relationships, channel relationships, supplier management, outsourcing with vendors and other aliases. In the fourth quadrant which is external/strategic, organizations adopt governance policies and procedures; therefore laws and regulations effects are felt operationally. A combination between the three stage model and the four quadrant grid framework has been proposed to form a conceptual corporate governance model that assists management in addressing the issues from a more comprehensive perspective. This conceptual corporate governance model is useful for IT governance development, therefore many organizations set up IT governance committees to enhance the ability of avoiding unnecessary risks and ensure keeping projects under controlled costs, schedules and strategic alignments.

2.2 Effective IT Governance Model

Weill, P. [4] studied IT governance in 23 countries for more than different 250 enterprises having different activities types. They found different ways of IT governance arrangements. Decision rights are being assigned to different archetypes in order to govern main IT decisions. Therefore, they proposed five major IT decisions (IT principles, IT Architecture, IT infrastructure Strategies, Business application needs, IT investments and prioritization [6]) to be made in large enterprises using six governance archetypes (Business Monarchy, IT Monarchy, Feudal, Federal, IT Duopoly, Anarchy [4]).

Good IT governance ensures that the right groups are making the key IT decisions so that those decisions enable the enterprise desired goals and behaviours. It Governance empowers the managers in the enterprise to make decisions without seeking additional senior management approval as they are being allowed by the governance framework. However, it is required to determine the effectiveness of the IT governance framework in terms of being able to function effectively without the Chief Information Officer (CIO) direct leadership [4].

2.3 Building Better Business Cases For IT Investments

Ward, J. et al [7] conducted a survey of over 100 European organizations to analyze the current practices in developing business cases and to find out how practices are related to the success of IT investments. As a result of this survey; they found that few organizations are satisfied with their ability to produce such a case. In addition, they noticed that organizations are more concerned about identifying and quantifying the expected benefits. Ward, J. et al [7] proposed a new six-step approach for building more accurate and robust business cases which consists of the following steps:

1. Defining the investment objectives and the business drivers.
2. Identifying investments benefits, benefits measurements, and benefits owner.
3. Structuring and differentiating the benefits according to business change type and benefits explicitness degree.
4. Classifying each expected benefits according to the main type of business change which are: doing new things, doing things better, and stop doing things.
5. Assigning each benefit to its explicit value.
6. Identifying all costs and the associated risks.

This approach proposed a 'benefit cost analysis' which enables management in understanding the expected benefits from an investment and deciding how much they are willing to invest. Moreover, it assists management to understand what should be done to achieve the desired business cases [4].

2.4 Control Objectives for Information and Related Technology (COBIT)

COBIT was created by the Information Systems Audit and Control Association (ISACA) and the IT Governance Institute (ITGI) in 1992. The first edition of COBIT was published in 1996, the second edition in 1998, the third edition in 2000, and the on-line edition became available in 2003, the fourth edition of COBIT was issued in December 2005, and the fifth edition was published in 2012 [75]. COBIT is being used increasingly by different type of organizations throughout the world. It is being used globally in a variety of ways by private industry, public accounting firms, government, and academia [71]. It is considered as the most appropriate control framework that help organizations in ensuring the alignment between use of Information Technology (IT) and its business goals. COBIT is considered as a set of tools that are being organized into a framework which can be used by executives to ensure that their IT is helping them in achieving their goals and objectives. In addition, it ensures that IT is working as effectively as possible to maximize the benefits of technology investment and to minimize IT-related risks. COBIT supports IT governance through providing a framework that ensures the alignment between business and IT, enhances and maximize business benefits, manages IT risks appropriately [8]. Generally, COBIT improves IT efficiency and effectiveness; it helps IT in understanding business needs, and assists executives in understanding and managing IT investments throughout their life cycle. There are a plenty of benefits from adopting COBIT in business, it provides a common language for management, executives and IT professionals, it assists in showing how business and IT can work together for delivering a successful IT initiatives. Moreover, it reduces operational risks, and assists in

developing a clear policy. COBIT introduces an IT governance framework and supporting toolset which allows IT managers to bridge the gap between control requirements, technical issues and business risks [71,72,73,74].

COBIT assists in assigning a clear ownership and responsibilities based on process orientation which is important for IT governance [8]. COBIT framework consists of three main parts which are control framework, management guidelines and implementation toolset. COBIT has 34 objectives [72,73,74,76,77,78,79] which are categorized under the following four domains [66,67,68]:

- Plan and organise (PO): which highlights the organizational and infrastructural form, it includes defining a strategic IT plan, information architecture, determining the technological directions, managing IT investments, assessing risks, ensuring compliances with external requirements, managing human resources, projects and quality.
- Acquire and implement (AI): which identifies IT requirements, acquisition and implementation of information technology within the company's current business processes. It also addresses the maintenance plan.
- Deliver and support (DS): which focuses on the delivery aspects of the information technology, including the support processes as well as security issues and training.
- Monitor and evaluate (ME): which covers company's strategy in assessing the needs of the company, whether objectives are met and whether the company complies with the regulatory requirements.

COBIT's framework also identifies which of the seven information criteria (effectiveness, efficiency, confidentiality, integrity, availability, compliance and reliability), as well as which IT resources (people, applications, technology, facilities and data) are important for the IT processes to fully support the business objective [73]. COBIT was actually released as an IT process and control framework, linking IT to business requirements [78,80,81, 82].

2.5 Balanced Scorecard

Balanced Scorecard (BSC) was initially originated by Robert Kaplan and David Norton [31, 34] as a performance measurement framework that added strategic non-financial performance measures to traditional financial metrics; to give managers and executives a more 'balanced' view of organizational performance. While the phrase balanced scorecard was coined in the early 1990s. Currently BSC is considered as one of the major IT governance frameworks that it is used for evaluating and

measuring companies' activities in terms of its vision, process and strategies [32]. BSC is a strategic planning and management system that is used extensively different type of organizations; to align business activities to the vision and strategy of the organization, improve internal and external communications, and monitor organization performance against strategic goals [31]. BSC has evolved from its early use as a simple performance measurement framework to a full strategic planning and management system. It provides a framework that not only provides performance measurements, but helps planners identify what should be done and measured. It enables executives to truly execute their strategies. In addition, BSC is a management system (not only a measurement system) that enables organizations to clarify their vision, process and strategy in order to translate them into action [35]. It provides feedback around both internal business processes and external outcomes in order to continuously improve strategic performance and results.

2.6 Information Technology Infrastructure Library (ITIL)

ITIL is published by the British Office of Government Commerce (OCG) and have emerged to become a standard for Service Management. It is a library that presents a set of best practices for managing IT services while focusing on how should be the IT services and processes, or in other words; focuses on the delivery of services and support considering the technical aspects of monitoring the process [40,41]. ITIL is organized around eight areas: service delivery, service support, application management, infrastructure management, security management, software asset management, planning to implement service management, and business perspective [41, 42].

2.7 Committee of Sponsoring Organizations (COSO)

The framework COSO [43, 44] is a standard for establishing internal controls in organizations and to determine their effectiveness in any area of the organization. COSO is a framework for auditing procedures applied in organizations. When comparing COSO with COBIT, COSO is more generic; it can be used in any enterprise's activities, while COBIT is devoted entirely to the area of IT. COSO is a highly abstract conceptual framework that does not address IT complexity and risks [49]. Organizations and auditors in computerized environments are adopting specialized frameworks, such as COBIT, to supplement COSO. Most international organizations are adopting the COSO framework for their evaluation, but are supplementing its control criteria by COBIT. Luthy and Forcht [83] compared COBIT and COSO for the purpose of compliance with rules and regulations. The comparison results revealed that both

COSO and COBIT take an organization-wide view. However, COBIT only considers an organization-wide view to the extent of ensuring that IT governance is aligned with overall business objectives and organization governance. COBIT also provides very detailed IT control suggestions within its presentation of detailed control objectives. The study also concluded that COSO on its own may not provide sufficient guidance for organizations and auditors as they consider compliance with laws and regulations. The study also suggested that it may be useful, if not necessary, to use more than one framework for assessing compliance with rules and regulations.

On the other hand, when comparing COBIT with ITIL, COBIT covers all activities of IT while ITIL is more detailed, processes oriented and focused on services management and service delivery for supporting COBIT; while COBIT helps to bind the ITIL best practices to the requirements of Business and the IT managers [50].

2.8 International Organization for Standardization (ISO)

The standards ISO 9000 [45] is a combination of standards that specify quality management system's standards of organizations. It is a set of guidelines, requirements, and other documents to manage and improve organizations' efficiency. However, ISO 9000 does not provide guidelines for the management and control of Information system. The standards ISO 17799 [46, 47] is considered as the "Good practice for Information Security", it provides recommendations for information security management to who is responsible for introducing, implementing or maintaining IS. Moreover, the standards ISO 27000 [47] helps in establishing procedures to secure the management of Information Systems. In addition the standards ISO 14000 addresses different aspects of environmental management. It assists organizations in identifying and controlling their environmental impact and improving their environmental performance [51].

2.9 Six Sigma

Six Sigma is a methodology that is used to operate all repetitive work processes in the best possible manner [48]. It focuses on eliminating the defects in processes within an organization that aims to offer its customers more than one service, close to perfection. Six Sigma focuses on minimizing defects in the outcomes including any defect that can lower customer satisfaction. Maximizing customer satisfaction will improve organization's performance and provide a global competitive advantage. Six Sigma is all about enhancing customer satisfaction, which emphasize on the importance of identifying the corporate customers and their important needs, which called customer critical-to-quality (CTQ) [48].

Six Sigma framework starts by defining project's goals and customers' needs, then it measures customers' requirements and review industry and competitors' benchmarks. Later on, information review, concepts generation and process development takes place. Afterward, the framework review risks and financial issues, and analyze ongoing development. Finally, a process of design optimization takes place along with process control and procedure documentation [48].

3. Web 2.0 and its Main Services

Web 2.0 was a term that is used to describe the web site technology beyond the initial static websites [84]. Web 2.0 term used to define or describe the concept of second generation websites. It is associated with the ongoing evolution of the World Wide Web from collection of websites to better computing platform with web application that meets the needs of the end user. There are various fundamental principles and indicators of Web 2.0 technologies that are important to e-commerce. The term was coined in 1999 and is associated Tim O'Reilly and O'Reilly Media Web 2.0 conference in 2004[85]. The term Web 2.0 began its rise in popularity when O'Reilly Media and MediaLive hosted the first Web 2.0 brainstorming conference in 2004 [9]. Due to O'Reilly Media Web 2.0 conference, the term Web 2.0 is closely associated with Tim O'Reilly [9, 36]. Web 2.0 terminology was officially coined by Dale Dougherty the vice president of O'ReillyMedia during a team discussion on a potential future conference about the Web in 2004 [9]. The team wanted to capture the feeling that despite the dot-com successes and subsequent flunk, the web was more important than ever, with exciting new applications and sites popping up with surprising regularity [9]. Web 2.0 is also closely associated with the new version of World Wide Web. Web 2.0 supports the interaction and collaboration with social media dialogue and user-generated content that include social networking sites, wikis, blogs, web applications, folksonomies, mashups, video sharing, instant messaging (IM), and hosted services [86,87]. Web 2.0 basically refers to the transition from static Hyper Text Markup Language (HTML) web pages to a more dynamic web that is more organized and is based on serving web applications to users. Other improved functionality of Web 2.0 includes open communication with an emphasis on web-based communities of users, and more open sharing of information [37].

The enterprise 2.0 helps employees, shares, suppliers and customers collaboration, and organization powered by Web 2.0 technologies called Enterprise Web 2.0 [88]. Enterprise Web 2.0 is bringing informality and accessibility (disruptive technologies) in businesses. Web 2.0 supports various internet/online applications hence can

be used to create and maintain social networks [89]. The social connections capabilities allow users to share opinions, knowledge, experiences, and content trail such as opinions, ratings, discussions, postings, and comments among others. The user-generated content (UGC), which is the participatory nature of the Web 2.0 has three basic requirements that include the following [90,91]. Firstly, contents have to be published on Web 2.0 site [92]. Secondly, the content should portray creativity [92]. Thirdly, the information should originate from external professional source [93]. In the enterprise world, the UGC include blogs, contents developed by bloggers and multitude of Web 2.0 technologies of the social media [93]. Some of the widely known types of Web 2.0 technologies used in popular sites include Blogs, Wikis, Social Networking sites, and File Sharing [84,85]. Nevertheless, there are problems associated with Web 2.0 technologies that are strongly linked to incapability of the technology to either provide security barriers or achieve certain requirements [84,88].

Several Web-based services and applications are considered as the foundations of the Web 2.0 concept. These services include blogs, wikis, multimedia sharing services, content syndication, podcasting and content tagging services. Web 2.0 services are based on four wide types of technologies which are presented in Table 1 [66]. Many of web technology services have been in use for a number of years, despite the added new features and capabilities on a regular basis. In this section, the well known and commonly used Web 2.0 services will be introduced.

Table 1: Types of Web 2.0 technologies

Technology	Examples of technology
Publication: Allows editing and contributing in contents by various users in real time	Blogs, wikis and file sharing
Syndication: Permits sharing, consolidation and sourcing information from different sources	Really Simple Syndication (RSS), social bookmarking and tagging.
Collaboration: Allows creating communities to collaborate on projects	Social networking
Recombination: Pulls data from different sources to create a new service, it is easy to create and can be used for various purposes	Podcasts and mash - ups

4. Web 2.0 Challenges in Enterprise Deployment

There are a plenty of advantages for adopting Web 2.0 technologies in the enterprise such as: increasing productivity, innovation, efficient project management,

efficient business process management, improving organizational reputation, enhancing internal communication and collaboration. Web 2.0 adoptions in enterprises (termed Enterprise 2.0) allow internal and external stakeholders to communicate, collaborate, participate and contribute [13].

Despite the offered Web 2.0 business opportunities, there are challenges in how corporations can control communities, manage information sharing and protect corporate information. Business Web 2.0 challenges can't be ignored before deciding to adopt Web 2.0. Similar to all traditional web applications development and delivery challenges, it inherits all these challenges that includes: project management challenges such as resources, budgets and requirements availability, technology limitations challenges like scalability, development methodologies, security, and interoperability. However, the most important challenge of Web 2.0 applications delivery is the adoption of Web 2.0 services by the corporate, people and technology. Different corporate have different culture and various ways in achieving things. Each corporate has its own culture that depends on the corporate age; therefore old corporate have big issues in changing and using new technologies in comparison with the new corporate. Some employees may feel insecure whenever there is a new technology to be used and some users adhere to use e-mails and traditional tools for collaboration and communication rather than switching to new Web 2.0 services due to their fears in affecting their work efficiency negatively. Therefore overcoming all of these challenges is very important when adopting or think to adopt Web 2.0 services in corporate [38, 39]. On the other hand, it is not possible to replace all the existing corporate applications with Web 2.0, but the data from these applications may be required in new Web 2.0 services. Therefore, integrating these applications is important when adopting business Web 2.0 services [38].

As much as the adoption of Web 2.0 seems to be well, it is however facing some resistance due to security concerns. For instance, many organizations have adopted some of the Web 2.0 technologies only use a few of them [94]. Most businesses do not trust the security capabilities of some of the Web 2.0 technologies [95]. IT developers have to enhance versions of the Web 2.0 technologies that must first ensure security in order to fully adopt the Enterprise 2.0 for businesses [95]. Businesses will always hesitate from embracing anything that appears insecure because they make profit by evading risks including those seemed to be imposed by technologies [96]. Additionally, there is also the linkage between security in business and legal issues and since some of the Web 2.0 technologies do not seem to guarantee security [95]. This is the reason why many companies are adopting Web 2.0 technologies but these companies have not adopted all Web 2.0 technologies.

Another challenge associated with Web 2.0 is the relevance of the contents to the clients or Web 2.0 users. For instance, some companies have created the internet contents that are available but users or intended users fail to use because of the irrelevance of the contents [97]. It is evident that some of the Web 2.0 tools do not provide the information that people need hence they cannot be adopted by as expected. Nevertheless, technologies such as the intranet provide real time information to people hence has some sort of significance [98]. For example, the RSS delivers news feeds to employees and customers hence enables them to receive important business news for their respective relations and transactions. IT experts must figure out how to improve or eliminate the security problems associated with Web 2.0 technologies [95]. This would ensure the businesses are supplied with more effective Web 2.0 tools that would be effectively adopted since the indications of communication and security challenges in some of the tools have been shown to cause slow uptake of the technology [99]. One of the greatest challenges Web 2.0 users are facing is anonymity of users, which allows unscrupulous individuals to commit cyber crime or fail to fulfill some of the requirements or responsibilities as specified in business agreement and escape without trace [100,101]. In this regard, IT experts would be required to incorporate identity/directory services that ensure every user correctly provide personal information such as names, location, and type of access they are using [102]. However, there are multiple experimentations on different Web 2.0 tools that are used by different individuals and organizations, which make it hard to manage and support. This is one of the significant challenges facing the Enterprise 2.0 research.

Another challenge associated with these technologies was failure to serve the need of the customer. Because of this, some firms are experimenting on wikis and blogs to increase the number of features and quality of functionality. They have the customer-facing blogs, which are the informal sites that contain information that is not closely related to the firms' business transactions or relations [98]. For example, Wells Fargo offers non-corporate topics such as student. The site has hundreds of blogs about banks that have turned to be the most read non-banking sites. Additionally, some users within the company have started on video blogs.

Taking into considerations all these issues and challenges will help in adopting Web 2.0 technologies in enterprises and getting the most advantages of these technologies with controlling their potential risks.

5. Web 2.0 Adoption Theoretical Frameworks

Web 2.0 technologies adoption is considered as an important IT decision in enterprises. Therefore, adopting

Web 2.0 in enterprises usually requires a specific IT governance framework to be followed. We will call such of these frameworks by Web 2.0 adoption governance frameworks. Many researchers highlighted the main IT governance theoretical frameworks which are the basic for modeling governance frameworks for any IT technologies investment decisions. Consequently, different Web 2.0 adoption theoretical frameworks have been surveyed in this section of our research paper.

5.1 An Iterative Web 2.0 Adoption Model for Enterprises

Sourav M. [13] classified enterprise 2.0 adoption challenges into two broad categories that are related to both internal and external challenges and called Formative State of Web 2.0, and Social Computing Aspects of Web 2.0 respectively [13].

Sourav M. [13] recommended an iterative adoption model with short implementation phases for handling these challenges. Each iteration involves four basic steps which are: identify, analyze, plan and implement. Each iteration is supported with continuous assessment from both: Web 2.0 innovation including changes happening in the industry, and the current state of Web 2.0 adoption. According to the received feedback from assessment, a decision is made concluding whether to proceed to the next level of Web 2.0 implementation or to stop. It also provides guidelines on the required Web 2.0 features to adopt in the next iteration implementation.

5.2 Chief Information Officer Web (CIOweb)

Cherinka, R. et al [15] proposed an Enterprise 2.0 interactive portal and tools set which are usually being developed by the Chief Information Officer (CIO), that's why they called it CIOweb. It is being used to shape and manage enterprise information, provide a strategic business planning process, develop Web 2.0 technical forecast and roadmap, influence long term objectives of the CIO and establish a governance structure to manage this environment. A Strategic Enterprise Plan (SEP) has been developed for the CIO to guide the IT department or IT enterprises in: Business Process Management, Project Management, Policy and Governance. SEP and its components are being hosted in a Web 2.0 environment, specially a wiki based environment called CIOweb; in order to empower the CIO with the benefits of social networking and Web 2.0 technologies in the enterprise governance and to provide an easy way to share the plan across the organization and offer everyone a mechanism to take part in building and realizing it.

5.3 Modeling Enterprise System Deployment for Web 2.0

Modeling enterprise system deployment has been developed by Markus, M. et al [16]. Their proposed model consists of four main phases, each phase is characterized by its key players, typical activities, appropriate performance metrics, characteristics, problems and possible outcomes. For our research papers we will just focus on the key players and the typical activities as these are an important parts of IT governance by identifying who has the right in different phases for this framework. The four ideal phases are as the followings:

Phase 1- Chartering Phase: The major outcome of this phase is a decision about whether or not to proceed with system implementation. Its key players include: software vendors, consultants, company executives, and IT specialists. The Typical activities in this phase are: building business cases, appointing a project manager, selecting a software package, approving budget and schedule.

Phase 2- Project Phase: Aims on implementing the selected information system in the specified organizational units. Its key players are: project manager, team members, internal IT specialists, consultants and vendors. The typical activities in this phase are: software configuration, system integration, data conversion, training, testing, and rollout.

Phase 3- Shakedown Phase: It ends when normal operations are being achieved. In this phase the project team may remain involved or may pass the control to end users and operational manager. Typical activities involved in this phase are: system performance tuning, bug fixing, staffing up to handle temporary inefficiencies, rework and retraining.

Phase 4- Onward and upward phase: The organization can realize if its investment has been succeed or not. and it can determine the benefits of its investments. The key players for this phase are: operational managers, IT support personnel, and end users. It involves the following typical activities: continuous business improvement, additional users' skill building, and post-implementation benefit evaluation.

Therefore, R  th, P. et al [17] used modeling enterprise system deployment as a starting point for developing, and deploying Web 2.0 systems in enterprises and understanding who has the input right in different implementation phases.

5.4 Web 2.0 Hosting Services Governance Portal

Yew-Huey Liu et al [18] proposed a work that shows the importance of Web 2.0 technologies in a new governance model in terms of quality and productivity improvements. The proposed hosting services governance portal [18] is

establishing role specific tree navigation view for each of several user roles, such as My Clients, My Servers, My Actions, and My Financials. From different views the user can go for more specific details easily from the tree navigation views that are built on a portal environment. Portal users can find all required information from various levels inside the role specific tree navigation views. The proposed portal software [18] can provide Platform as a Service (PaaS) to other data centers that doesn't have their own governance system and still using spreadsheets for accounts and projects management. Furthermore, different corporate departments or different organizations require a portal on a platform that integrates clients, services delivery specialists, and tools. Therefore Web 2.0 technologies play an important role in emerging best practices by group wisdom, as timely feedback is recorded during process execution.

5.5 The Fit-Viability Model

Tjan A. K. [19] proposed the original fit-viability model for evaluating organizational adoption of e-commerce initiatives. It includes two dimensions: fit and viability. The fit dimension measures the extent to which new applications are consistent with the firm's needs, core competency, structure, value and culture of organization. The viability dimension measures the extent to which value can be added by new applications. It also examines the requirements of human resource, capital needs and so on. Moreover, Liang et al. [20] and O'Donnell et al. [21] adapted this model to assess in the adoption of mobile commerce technologies.

Turban, E. et al [22] proposed a modified fit-viability-based framework for the adoption of social software for group decision support. The proposed framework includes two major components: (a) the opportunity that is driven by the fit between the intended decision making tasks and available social software tools; and (b) the implementation factors and the constraints that need to be considered to assess project viability. Enterprises should deploy those projects that are most fit and viable. For projects that are fit but not viable, the organization should prepare itself to increase the readiness before deploying the technology. The enterprise should not adopt a technology that does not fit the decision making process tasks. Once the fit and viability are satisfied, organization can deploy social software for group decision support with the expectation of improving collaboration, quality and speed of the decision process [22].

5.6 A Conceptual Model for Business to Employee (B2E) Portal Adoption

Sugianto, L.F. et al [23] have introduced a conceptual model on the decision to adopt B2E portal in organizations.

The proposed model has been developed based on existing Technology-Organization-Environment (TOE) model which has been developed by Tornatzky L. and Fleischer M. [24] in order to study adoption of general technological innovations.

TOE framework identifies a number of factors that influence management decision to adopt B2E portal. These factors have been classified under four contexts: technological innovation context, organizational context, environmental context and employee context. This proposed model serves as a useful map for exploring and testing relationships among these factors. The scope of technological context extends to all available technologies which are internally within the organization and externally accessible at the market. Organizational context is typically defined in terms of several descriptive measures, such as firm size and scope, the quality of its human resource and the amount of slack resources available internally. Environmental context includes the relevant domains in which the organization interacts with to conduct its business [23,24]. In addition to the TOE contexts, Sugianto, L.F. et al [23] introduced the fourth aspect to be the Employee context which includes employees' IT knowledge and their willingness.

Generally, the use of B2E portal provides many benefits for organizations' employees and companies through simplifying many of business process and human resources process. Employees are empowered through the use of the portal system that provides consistent portal Graphical User Interfaces (GUIs), multiple value propositions, comprehensive collaborative work environment, and real time dynamic information delivery [25].

The proposed model and the research findings can assist senior management in portal adoption decision and evaluating the organization for its readiness from different dimensions to ensure that the deployment of the portal is a valuable investment [23].

6. Comparison between Web 2.0 Adoption Frameworks

Different existing frameworks and models of Web 2.0 technologies adoption in enterprises have been surveyed. All the discussed Web 2.0 adoption frameworks in section 6 are being evaluated and compared according to different criteria such as: main features of each framework, uses, benefits, requirements, limitations and required improvements. A summarized comparison is represented in Table 2.

Framework / Model	Main Features	Uses	Benefits	Requirements	Limitations & Improvements
Iterative Adoption Framework	<ul style="list-style-type: none"> - Each iteration involves four basic steps which are: identify, analyze, plan and implement. - Each iteration has a continuous assessment. - Based on the returned assessment feedback: It will provide a decision whether to go in the next level of a given Web 2.0 features implementation or to discard the same. - It provides some suggestions in terms of taking other Web 2.0 features for next iteration implementation. 	Adoption of Web 2.0 technologies in enterprises.	<ul style="list-style-type: none"> - It provides good framework for accountabilities in important IT decisions. - It assists in making good decisions at different phases of Web 2.0 technologies adoptions. 	Assessment from both: <ul style="list-style-type: none"> - Web 2.0 innovation and changing happening in the industry. - The current state of Web 2.0 adoption. 	Not all the implemented Web 2.0 features should provide the anticipated business benefits. That's why an incremental approach will always be more helpful.
Chief Information Officer Web (CIOweb)	<ul style="list-style-type: none"> - MITRE used to develop SEP for the CIO - SEP and its components are being hosted in a Web 2.0 environment, specially a wiki based environment called CIOweb in order to provide an easy way to share the plan across the organization and offer everyone a mechanism to take part in building and realizing it. 	Guide the IT department in: Business Process Management, Project Management, Policy and Governance.	<ul style="list-style-type: none"> - Better decisions made. - Identifies stakeholders and their behaviours. - Encourages adoption of IT guidelines and policy. - Highlights the value of measurement for decision making. - More agile, responsive and cost-effective IT environment. 	<ul style="list-style-type: none"> - MITRE - SEP which is developed through using MITRE. - Wiki environment. 	There is a need for establishing the governance framework to support technology transition.
Modeling Enterprise System Deployment	<ul style="list-style-type: none"> - It consists of four main phases for development, each phase is characterized by its key players, and typical activities. - It provides a starting point for developing, and deploying Web 2.0 systems in enterprises and understanding who has the input right in different implementation phases. 	Modelling Enterprise System deployment	It provides a starting point for developing, and deploying Web 2.0 systems in enterprises	<ul style="list-style-type: none"> - Four main phases and each phase is characterized by its key players and typical activities. 	Each phase needs a specific assessments and analytical measures before moving to the next phase.
Hosting Services Governance Portal	Establishing role specific tree navigation view for each of several user roles, such as My Clients, My Servers, My Actions, and My Financials.	Governance model, provide portal on a platform that integrates clients, services delivery specialists, and tools.	<ul style="list-style-type: none"> - Provide PaaS to other data centers that don't have their own governance system. - It plays an important role in emerging best practices by group wisdom, as timely feedback is recorded during process execution. 	<ul style="list-style-type: none"> - Portal environment - Role specific tree navigation view. 	Improvement is required by making business intelligence information available to client to show how client business is supported by IT.
Fit-Viability-Based Framework	The proposed framework includes two major components: (a) the opportunity that is driven by the fit between the intended decision making tasks and available social software tools; and (b) the implementation factors and the constraints that need to be considered to assess project viability.	Adoption and use of social software for group decision support.	<ul style="list-style-type: none"> - Helps in organizing various considerations in adopting social software for group decision making. - Useful for researchers in evaluating the critical success factors of using Web 2.0 technologies for group decision support. 	<ul style="list-style-type: none"> - Fit and viability testing. 	To increase the benefits of social software as facilitator of group decision making, it is useful to extend the use of Web2.0 to Web 3.0.
Conceptual Model on the Decision to Adopt B2E Portal in Organizations.	It has been developed based on existing Technology-Organization-Environment (TOE) model with adding the employee context.	B2E Portal Adoption Decision through analyzing different dimensions.	It assists in evaluating the organization for its readiness from different dimensions to ensure that the deployment of the portal is a valuable investment.	<ul style="list-style-type: none"> - Analysis of the following dimensions: Technology, Organization, Environment, and Employee. 	It doesn't provide a performance measures to assess the effectiveness of portal adoption.

Table2: Frameworks and Models for Web 2.0 Adoption in Enterprises

7. Proposed Web 2.0 Adoption Governance Framework

In order to adopt Web 2.0 technologies, internal control should be implemented at different levels. Therefore, based on the conducted literature review around IT governance frameworks and the accomplished comparison between Web 2.0 adoption frameworks, COBIT framework was selected as a control framework for Web 2.0 adoption process because of its general applications

and advantages, its usability to manage and control information security, and due to its applicability with different type of organizations as mentioned in section 2.4.

We proposed a new hybrid adoption governance framework which consists of the best needed features from four existing Web 2.0 adoption frameworks [13, 15, 22, 23] combined in a way that serve enterprises needs and governed by COBIT framework. The proposed Web 2.0 adoption governance framework is considered to assist in governing Web 2.0 adoption in enterprises. It consists of

an iterative four main steps which are: Identify, Analyze, Plan and Implementation. Each step is controlled by specific stages in COBIT framework as it is clearly illustrated in our proposed framework in Figure 1. The main COBIT four stages are as the followings:

- Plan and organise stage defines a strategic Web 2.0 plan and architecture, identifies enterprise's goals and objectives and ensuring compliances with external requirements. In our proposed framework it will control the identification step.
- Acquire and implement stage identifies Web 2.0 requirements and implementation factors of adopting Web 2.0 technologies within the company's current business processes. In our proposed framework it will control the identification step as well.
- Monitor and evaluate stage covers enterprise's strategy in assessing the needs of the company, whether objectives are met and whether the company complies with the regulatory requirements. In our proposed framework it will control the analysis and plan step.
- Deliver and support stage focuses on the delivery aspects of the Web 2.0 technology, including the support processes as well as security issues and training. In our proposed framework it will control the implementation step.

In the identification step, different implementation factors and opportunities are being identified in the context of Technology-Environment-Organization-Employee (TEOE). The identification of the opportunity dimension includes technology innovation context and environmental context. Technology innovation context includes: perceived benefits, perceived complexity, perceived compatibility, perceived implementation cost and perceived risk. In addition, the environmental context includes: perceived employee pressure and the perceived Web 2.0 vendor pressure. The identification of implementation factors includes organization and employee context. Organization context includes: senior management support, technical competence, and financial resource availability. While the employee context includes: Perceived IT knowledge of employees and perceived willingness of employees.

Analysis and plan step consist of a continuous assessments of the output from the identification step. The continuous assessment consists of four main sub-testing which are: Fit, Viability, Current state of Web 2.0 adoption, Web 2.0 innovations and changing happening in the industry. Fit assessment measures whether adopting Web 2.0 technologies consistent with the firm's need or not. Viability testing checks the willingness of adding value to the enterprise when adopting Web 2.0 technologies.

According to the returned feedback from the assessment, it will provide a decision whether it make sense for the

enterprise to go in the next level of a given Web 2.0 features implementation or to discard the same.

In addition, it provides some suggestions if it is required to take other Web 2.0 features for next iteration implementation.

Therefore, according to the analysis and plan output which consists of the assessment feedback; Web 2.0 adoption decision making occurs and according to the decision making, Web 2.0 technologies will be deployed and adopted. These occur in the implementation step in which the decision is being made for deployment and adoption. All these procedures are aligned with the CIOWeb which is a wiki environment that includes Strategic Enterprise Plan (SEP), Governance, Policies, Processes Managements and Projects Managements. The proposed Web 2.0 adoption governance framework is illustrated in Figure 1.

8. Research Methodology

The methods of research undertaken for the project were literature review, case study, in-depth interviews and website analysis for a specific public organization in Emirates of Abu Dhabi. According to Yin [30], the conducted case study here is considered a single case study that focuses in analyzing deeply one specific organization through a descriptive case study type with a qualitative approach. Therefore the unit of analysis for this research paper is considered the chosen organization. The case study was conducted over a period of four months in Emirates of Abu Dhabi. The involved organization in the study was selected among the others based on the availability of senior IT knowledge workers and business decision makers in this organization and due to its wide popularity in Emirates of Abu Dhabi. Organizational in-depth interviews were conducted in accordance with the guidelines established by the chosen organization Human Resources Ethics Committee.

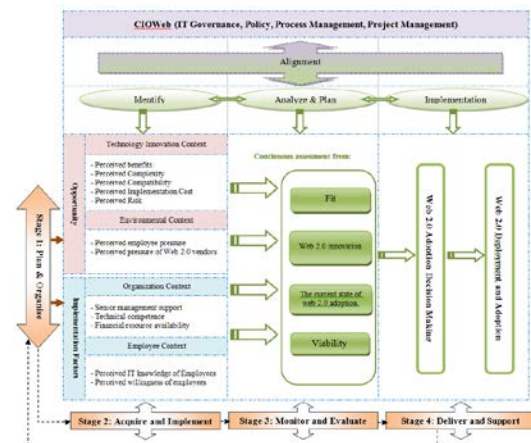


Figure 1: The proposed Hybrid Web 2.0 Adoption Governance Framework

In-depth interview participants were informed of the purposes of the project and their identity were kept anonymous according to their preferences and organizational ethics. In-depth interviews were conducted using a semi-structured approach, which was similar to the data collection methods used in other technological adoption researches [27,28,29]. Three in-depth interviews were undertaken. The first in-depth interview was conducted with the IT Manager via the telephone, the second and third interviews were conducted face-to-face with the Application Development Officer and the System Engineer respectively. This research method was selected to obtain further insight into the extent to which businesses understand and utilized IT governance frameworks and Web 2.0 technologies adoption. In-depth interviews were also imperative to the creation of the project's case study as it provided the required enterprise information.

9. Case Study

To study the status of Web 2.0 governance in a real enterprise, we chose a governmental organization in Emirate of Abu Dhabi that has branches in Al Ain and Western Region. The chosen organization is the regulative body of the Healthcare Sector in the Emirate of Abu Dhabi that ensures excellence in Healthcare for the community by monitoring the health status of the population.

10. Discussions and Recommendations

From the case study findings, it is clearly noticed that the chosen governmental organization is following COBIT framework for their IT governance after customizing it according to their needs and according to their policies, regulations which are aligned with ADSIC guidelines. Moreover, according to the interview responses and our findings, this governmental organization has adopted several Web 2.0 technologies in their intranet portal and extranet website. They are having a specific followed process for adopting Web 2.0 technologies and specific usage policies to be followed by all users. However, they aren't having a formal framework for Web 2.0 technologies adoption; there is a plan to implement their formal Web 2.0 adoption framework within three to five years and certainly it should be aligned with their ADSIC guidelines and compatible with their followed IT governance framework which is COBIT.

From our point of view, implementing a formal Web 2.0 adoption framework is not requiring a too long time for implementation as their specification which is three to five years. We think that this long specified period is due to the organizational budgets and financial issues or it could be because of the lack of employees' or experts having Web

2.0 adoption governance knowledge and skills at this organization.

Based on our findings and according to the organizational specifications and Web 2.0 adoption process, we can recommend for this organization our initially proposed framework in section 7 but after enhancing and customizing it according to this organizational process and needs, the enhanced and customized Web 2.0 adoption framework is illustrated in Figure 2.

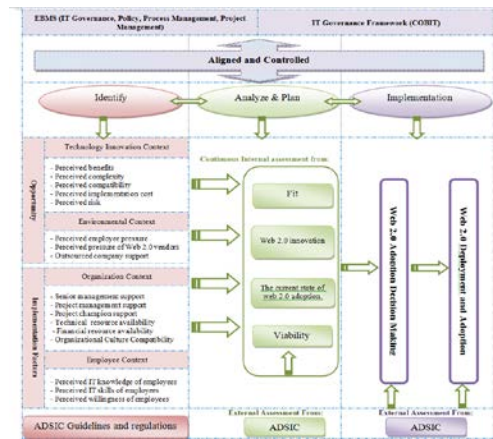


Figure 2: Enhanced and Customized Governance Model for Hybrid Web 2.0 Adoption Framework

In identification step we added the organizational implementation factors besides our previously mentioned implementation factor in our initial proposed framework. According to the research findings and the second interviewee (Mr. H.A.B.) responses about the Web 2.0 technologies adoption implementation factors, the added implementation factors includes identifications of: different supports from outsourced company availability, project management and project champion supports, compatibility with organizational culture, organizational and departmental employees IT skills, related ADSIC guidelines and regulations.

In Analytical, planning and implementation steps, a continuous external assessment have been added at those steps. ADSIC is continuously assessing the whole process during the entire project lifecycle. Therefore, we added ADSIC external assessment beside the internal assessment which was the only assessment included in our initial framework. Moreover, ADSIC continuous assessment has been added in the implementation step as well; because ADSIC is assessing the project before implementation, during implementation and after implementation.

In addition, according to research findings and the third interviewee (Mr. M.K.) responses about the used Web 2.0 technologies adoption framework in the organization which is as the following: "We are having a strategy and plan to implement our own formal Web 2.0 adoption framework which is aligned and compliances with our IT

governance framework within the coming three to five years. However, we are starting initially to have our own IT policies, standards, guidelines, regulations, procedures and governance but still we didn't implement the formal Web 2.0 adoption framework. We are having an agreed process for adopting any new technology including Web 2.0 technologies". The proposed framework has been customized in a way making the whole Web 2.0 adoption framework aligned and compatible with the organizational followed IT governance framework which is COBIT framework. As a result, we added COBIT IT governance framework within the alignment requirement.

Furthermore, according to the literature review [15] we were including the CIOweb in our initially proposed framework which consists of all IT governance, policies, process management and project management in a wiki based environment, but now after identifying and analyzing the organization in the case study and according to the first interviewee (Mr. A.M.A.) responses about the adopted Web 2.0 technologies at their organization, different applied web 2.0 technologies has been mentioned, here is a part of the interviewee response mentioning the used wiki environment at their organization:

"We are having all our strategies, policies, procedures, regulations, guidelines, and directions aggregated in a wiki based environment which is called Electronic Business Management System (EBMS). It is accessible and reachable by all employees in a simple environment which is governed by their usage policies and Information Security Management System (ISMS) Framework. All these usage policies and guidelines are compliance with Abu Dhabi System and Information Centre (ADSIC) strategies, regulations and standards".

Therefore, according to the research findings, this organization is having such a wiki based environment called Electronic Business Management System (EBMS) which includes the whole organizational policies, rules, regulations, standards, and IT governance. Consequently the whole Web 2.0 adoption processes should be aligned with the EBMS contents.

11. Conclusion, Limitations and Future Works

Web 2.0 technologies are currently contributing to the key goals and objectives of governmental organizations in the public sector. They assist organizations in improving employees' productivity, sharing information, communicating with each other and enhancing business process. Adopting Web 2.0 technologies requires a specific adoption framework that is aligned and controlled by the organizational followed IT governance framework. The decision of Web 2.0 technologies adoption in an organization is considered as an important IT decision;

therefore, based on the IT governance definition which is specifying a framework for decision right and accountabilities for important IT decisions, adoption of Web 2.0 technology requires specifying a framework for accountabilities of Web 2.0 adoption decision, identifications of implementation factors and the governance of the whole Web 2.0 adoption process through a specific framework that is consistent with organizational policies, procedures, guidelines and the overall organizational IT governance framework.

In this paper, we discussed a number of theoretical IT governance frameworks which are considered as a basis for different Web 2.0 governance frameworks; therefore, consequently we discussed a wide range of the current Web 2.0 adoption theoretical frameworks. A comparison has been conducted between the discussed Web 2.0 adoption framework and a theoretical Web 2.0 adoption governance framework has been proposed consequently.

Moreover, this paper discussed the adoption of Web 2.0 technologies and the factors that influenced uptake of new technologies by a specific governmental organization in the Emirates of Abu Dhabi Public Sector. In-depth interviews were used to ascertain the level of Web 2.0 uptake in the chosen governmental organization and to know the advantages and the impact of the employed Web 2.0 technologies on the overall business process. The barriers to Web 2.0 adoption and challenges of using the technology were also discussed. According to the case study and the research findings a more customized Web 2.0 adoption governance framework has been proposed specially for the chosen organization based on the organizational needs.

It can be concluded that the involved organization in the research case study is realizing the importance of Web 2.0 technologies to their organizational business process. The high levels of current and planned Web 2.0 adoption indicate that this technology is impacting the business now and will continue to do so into the future.

This research project was conducted by only one researcher; this meant that there were certain limitations to the scope of the research. Therefore, it was only focusing in the case study for one specific governmental organization in Emirates of Abu Dhabi public sector. In addition, it has been noticed that the interviewees were not very accurate and honest in their responses and were hesitating in providing some confidential information at the beginning of our interviews according to their organizational ethics and policies.

However, for our future work more comprehensive study will be conducted over multiple governmental organizations in Emirates of Abu Dhabi in order to compare Web 2.0 technologies adoption between them and to analyze their impact in different businesses. Moreover, studying the employees attitude towards Web 2.0

technologies adoption could be considered as an interesting dimension to be studied and analyzed.

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