Exploration of IT Governance Practices and their Effect on Strategic Projects' Outcomes in Public Sector Organizations of Pakistan

Amanat Ali[†] and Asim Nisar[††],
amanat_10@yahoo.com aasim_n@yahoo.com
[†] *Department of EM, Center for Advanced Studies in Engineering (CASE) , Islamabad, Pakistan*
[††] *Department of EM, Center for Advanced Studies in Engineering (CASE) , Islamabad, Pakistan*

Summary
Most IT initiatives in Public Sector Organizations (PSOs) are undertaken in the form of e-government projects which are usually strategic IT projects. However, many of these projects face the risk of being abandoned, over budgeted and/or unfulfilled promises. Project management principles by default, although supportive, do not guarantee the success of these projects. Strategic IT projects need to be brought within the principles of IT Governance (ITG) for their success. The purpose of this study is to explore ITG practices and their effect on strategic IT projects' implementation success in the PSOs of a less developed country i.e. Pakistan. Mixed research methods have been applied. NVIVO-10 has been applied on qualitative data to analyze various themes and Partial Least Squares (PLS)-based structural equation modeling has been applied on quantitative data to test the proposed model. The findings of the study reveal that the explored practices have small to moderate effect on IT projects' outcomes. The practice "IT/business Communication and Partnership" found to be the most effective whereas the practice, "IT Structures for Responsiveness and Accountability" proved to be the least effective. The study provides important implications for public managers to improve their IT-related plans, optimize limited resources and consequently, improve & sustain public service delivery. The other countries and organizations operating in similar environment can also take the benefit of this study.

Key words:
Critical success factors, IT governance, IT project success, PLS-based structural equation modeling

1. Introduction

The use of IT has become imperative for many Public Sector Organizations (PSOs) to improve & sustain public service delivery and meet & extend organizational objectives and strategies [1]. This critical use of IT demands for a special focus on effective IT Governance (ITG) in these organizations. Consequently, effective ITG practices need to be determined, implemented and sustained if these organizations want to increase the contribution of IT to achieve their objectives.

Nevertheless, most IT initiatives in PSOs are undertaken in the form of e-government projects which are usually strategic IT projects. Many of these projects face the risk of being abandoned, over budgeted and/or unfulfilled promises. Typical global examples of such anomalies include UK's National Health Service project, Canada's Gun Registry project, Australia's Customs Service Systems project and USA's Trilogy and Virtual Case File project. Project management principles by default, although supportive, do not guarantee the success of these projects. Project management mainly focuses on nine/ten knowledge areas of Project Management Body of Knowledge (PMBOK) and does not explicitly cover the issues of responsibility, accountability, consultancy, reporting lines and resource allocation in organization. A project manager usually has less/no authority over processes, strategic alignment and compliance to regulations. Moreover, project management usually sees project success in terms of time, budget and quality. However, project success should be evaluated in terms of meaningful benefits that it provides to various stakeholders. Therefore, IT projects need to be brought within the principles of ITG for their success.

ITG is a structure and process through which organizations make right IT investment to ensure that the resulting activities (programs, projects & operations) are performed properly and desired benefits are achieved [2]. ITG ensures that IT and business share accountability regarding IT projects and helps in measuring their effectiveness which assists in avoiding rogue investment. Through properly implemented ITG, IT projects are managed effectively by default. IT projects undergo to the analysis of IT strategy, IT architecture and IT infrastructure & applications. IT investment is made and prioritized for right IT projects. The accountability is established, strategic alignment is enhanced and value delivery is measured against costs to ensure that IT projects meet current and future organizational needs. Risks are properly identified and mitigated before the start and during projects' execution with assurance that projects are not deviated from the original plan. In conclusion, ITG has become the standard through which IT projects are

Manuscript received August 5, 2016
Manuscript revised August 20, 2016

identified/selected and developed with viable value proposition and deliverables that reduce rogue investment.
However, ITG implementation in PSOs is more complex than their private counterparts due to many reasons including complex intra and inter-organizational interactions and synergies [3], more bureaucracy and less managerial autonomy [4], wider accountability and expectations [5]. Especially, the PSOs in less developed countries are very challenging. These are affected by low institutional capacity, limited involvement of stakeholders, high level of corruption and informality which obstruct their decision-making, control and accountability.
The objective of this study is to explore ITG practices in terms of Critical Success Factors (CSFs) and their effect on IT projects' implementation success in terms of task, organizational and public outcomes in the PSOs of a less developed country i.e. Pakistan. By understanding the relative importance of ITG practices (CSFs) for IT projects' success attributes (task, organizational and public outcomes), public managers can better improve their IT-related plans, prioritize limited resources and consequently, improve & sustain public service delivery.

This study investigates the following research questions:

RQ1: What is the effect of ITG practices on IT projects' task outcomes?
RQ2: What is the effect of ITG practices on IT projects' organizational outcomes?
RQ3: What is the effect of ITG practices on IT projects' public outcomes?

The rest of paper proceeds as follows. In the next section, prior research on ITG related CSFs is overviewed. In the third section, IT project success attributes are discussed. Research methodology is provided in the fourth section. Results and discussions are given in the fifth and sixth sections respectively. Conclusion is made in the final section.

2. Related Work

The concept of CSFs has gained much popularity by the work of Rockart [6] who defined it as *"the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization"*. Due to their importance, such factors are applied in various perspectives from a single project to the whole organization [7]. Both researchers and practitioners have well responded to the CSFs approach and applied it in various industries. However, less research has been conducted on CSFs for effective ITG and situation is even worst in the PSOs of less developed countries. Here is a brief overview of some of the previous studies.
Luftman et al. [8] identified six enablers of IT/business alignment which is one of the objectives of ITG. These enablers included senior management support, involvement of IT personnel in strategy development, understanding of IT personnel about business, IT/business partnership, well-prioritized IT projects and the role of IT leadership. Moreover, Teo and Ang [9] conducted a survey in 169 organizations and identified 18 CSFs for strategic alignment by considering it as the key objective of ITG. Furthermore, Guldentops [10] presented five CSFs. These CSFs mainly deal with structures and processes for governance and control of IT. Similarly, ITGI [11] proposed many CSFs for implementing effective ITG in organizations. These CSFs included considering IT as an integral part of the enterprise, awareness, stakeholders' engagement, accountability, communication and monitoring across the organization. De Haes and Van Grembergen [12] investigated ten minimum baselines ITG practices. These practices were validated as minimum necessary conditions for implementing ITG in the financial service sector of Belgian. The results indicated that IT steering committee and IT leadership were at the top of the list.
Some researchers have investigated CSFs especially in PSOs. Among them, Tan et al. [13] conducted a study in Australian PSOs based on ITIL framework and found that senior management commitment, awareness and training, performance/benefit management, appropriate guidelines and the use of an integrate tool set were the essential factors for success. Nfuka and Rusu [14] conducted a case study research in five PSOs of Tanzania in the perspective of a developing country. They investigated the CSFs to implement effective ITG in these organizations. The study found 11 CSFs in five focus areas of ITG mentioned by COBIT. The research revealed that most of the CSFs belonged to the strategic alignment focus area of COBIT which means business/IT alignment is an important issue in the PSOs. However, no study has investigated the effect of ITG related CSFs on public sector IT projects' implementation success.

3. IT Projects' Implementation Success Attributes

Traditionally, project success is measured against time, budget and specifications (requirements/quality) criteria [15] which reflect success from project team, vendors or suppliers' point of view. Non-traditionally, some researchers used the term project performance instead of project success using attributes, process performance (efficiency) and product performance (effectiveness) [16].

Process performance is measured against cost & schedule overrun and product performance is measured against specifications. However, Aladwani [17] provides three dimensions of project performance: task outcomes; psychological outcomes; and organizational outcomes. Task outcomes deal with efficiency and effectiveness, psychological outcomes deal with people's satisfaction and organizational outcomes deal with benefits to the organization [17]. These dimensions provide a better view of success in technical, social and organizational perspectives. Nevertheless, the purpose of IT investment or project approval process is to ensure that IT investment delivers significant benefits to the stakeholders as compared to alternative investment opportunities. No single benefit assessment technique is suitable for all organizations. For example, for public sector IT projects, benefits are usually measured beyond traditional financial measures due to the "best value" nature of the public sector instead of "profit" nature [18]. Therefore, in the context of public sector IT projects, a more comprehensive view of success can be obtained if such projects are evaluated in terms of task outcomes (efficiency & effectiveness), organizational outcomes (benefits to organization) and public outcomes (benefits to citizen, employees & businesses) which is also one of the objectives of ITG [11].

4. Methodology

The research was conducted into two phases i.e. qualitative & quantitative. In the qualitative phase, the relevant ITG practices in PakPSOs were identified in terms of CSFs through systematic literature review complemented with semi-structured interviews and archival records. The detail of qualitative phase is not given here due to shortage of space. However, a brief overview of the process is given below.

First, we explored studies on both public and private sector organizations. We used Google scholar search engine and Scopus database. A total of 55 papers were reviewed from which 18 found to be relevant. Second, we narrowed down our scope to the studies in PSOs. We found that very few studies have investigated CSFs in PSOs. Third, we confined our scope to the studies in PSOs of less developed countries and noted that the situation is even worst there. Resultantly, we logically harmonized identified CSFs in the perspective of PSOs in a less developed country. We left with 23 CSFs for further analysis. A questionnaire was developed based on these 23 CSFs. Semi-structured interviews of 18 senior managers were conducted in 8 PakPSOs. At least two participants (one from business and other from IT) in each organization participated in the interview process. Purposive sampling technique was used due to its simplicity. The respondents were asked to choose most relevant CSFs from the list with justification and/or enter their own as per their business settings. When a theme started reoccurring, the interview process stopped. Archival records were also assessed to verify the responses. Content analysis was applied to extract themes from the data. NVIVO-10 was used for this purpose. A total of 12 ITG related CSFs were found to be relevant for PakPSOs which are given in Figure 1.

In the quantitative phase, a research model was developed based on the CSFs finalized in the qualitative phase. The model was then tested by applying PLS-based structural equation modeling using sample data from PakPSOs.

4.1 Research Model and Hypotheses

The research model of the study is shown in Figure 1. It consists of 12 CSFs as independent variables and task, organizational and public outcomes as dependent variables. It is reasonable to believe that 12 CSFs significantly influence task, organizational and public outcomes. The description of each variable of the model and related research hypotheses are given below.

IT Leadership- this practice refers to the ability of CIO or similar position to manage and lead IT and transformation program which is often executed in the form of IT projects in PSO.

H1a: The degree to which IT leadership is demonstrated in organization significantly affects task outcomes.
H1b: The degree to which IT leadership is demonstrated in organization significantly affects organizational outcomes.
H1c: The degree to which IT leadership is demonstrated in organization significantly affects public outcomes.

Senior Management Involvement and Support- it refers to the engagement of executive and senior management in IT-related decision-making and monitoring processes for favorable results.

H2a: The degree to which senior management is involved and supports IT activities significantly affects task outcomes.
H2b: The degree to which senior management is involved and supports IT activities significantly affects organizational outcomes.
H2c: The degree to which senior management is involved and supports IT activities significantly affects public outcomes.

IT/Business Communication and Partnership- this practice refers to the formal mechanisms for promoting and developing shared knowledge/skills and understanding among business and IT people.

H3a: The degree to which IT/business communication and partnership is encouraged and supported in organization significantly affects task outcomes.
H3b: The degree to which IT/business communication and partnership is encouraged and supported in organization significantly affects organizational outcomes.
H3c: The degree to which IT/business communication and partnership is encouraged and supported in organization significantly affects public outcomes.

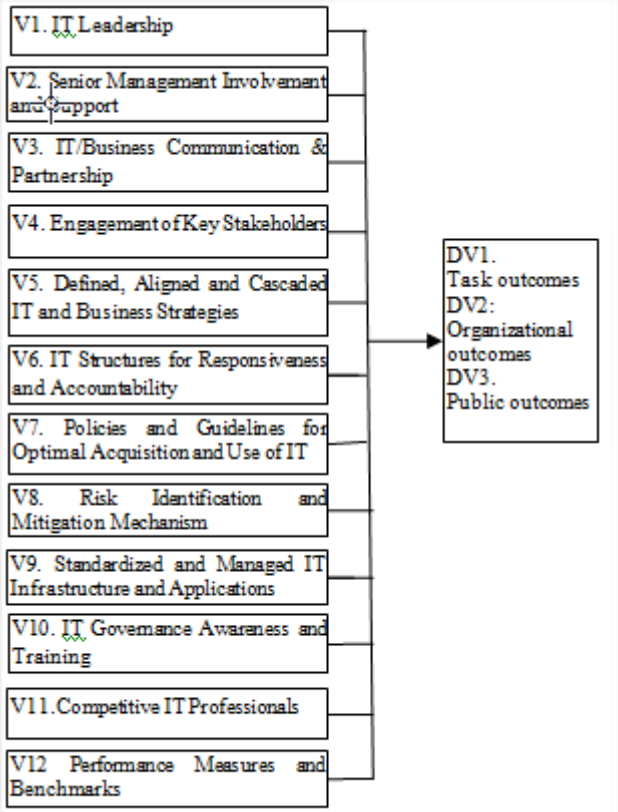

Figure 1: Research Model

Engagement of Key Stakeholders- this practice refers to the engagement of key stakeholders with clear roles, goals and shared understanding on common agenda and success criteria.
H4a: The degree to which key stakeholders are engaged in IT activities significantly affects task outcomes.
H4b: The degree to which key stakeholders are engaged in IT activities significantly affects organizational outcomes.
H4c: The degree to which key stakeholders are engaged in IT activities significantly affects public outcomes.
Defined, Aligned and Cascaded IT and Business Strategies- it involves properly defined, aligned and cascaded IT and business strategies with clear goals and targets.

H5a: The degree to which IT and business strategies are defined, aligned and cascaded in organization significantly affects task outcomes.
H5b: The degree to which IT and business strategies are defined, aligned and cascaded in organization significantly affects organizational outcomes.
H5c: The degree to which IT and business strategies are defined, aligned and cascaded in organization significantly affects public outcomes.

IT Structures for Responsiveness and Accountability - IT structures refer to the presence of responsible functions and clear roles & responsibilities for IT decision-making e.g. IT steering committee.

H6a: The degree to which IT structures for responsiveness and accountability are present in organization significantly affects task outcomes.
H6b: The degree to which IT structures for responsiveness and accountability are present in organization significantly affects organizational outcomes.
H6c: The degree to which IT structures for responsiveness and accountability are present in organization significantly affects public outcomes.

Policies & Guidelines for Optimal Acquisition and Use of IT - this practice refers to the instituting and enforcing best practices throughout the organization for clear processes, methods and frameworks to encourage desirable behavior and create and preserve optimal value of IT.

H7a: The degree to which policies and guidelines for optimal acquisition and use of IT are exercised in organization significantly affects task outcomes.
H7b: The degree to which policies and guidelines for optimal acquisition and use of IT are exercised in organization significantly affects organizational outcomes.
H7c: The degree to which policies and guidelines for optimal acquisition and use of IT are exercised in organization significantly affects public outcomes.

Risk Identification and Mitigation Mechanism- this practice involves analyzing and assessing IT risks, monitoring efficiency of internal controls and implementing necessary mechanisms to minimize risks.

H8a: The degree to which IT risks are identified and mitigated in organization significantly affects task outcomes.
H8b: The degree to which IT risks are identified and mitigated in organization significantly affects organizational outcomes.

H8c: The degree to which IT risks are identified and mitigated in organization significantly affects public outcomes.

Standardized and Managed IT Infrastructure and Applications- it involves the provision and management of standardized and reliable IT infrastructure and applications.

H9a: The degree to which IT infrastructure and applications are standardized and managed in organization significantly affects task outcomes.
H9b: The degree to which IT infrastructure and applications are standardized and managed in organization significantly affects organizational outcomes.
H9c: The degree to which IT infrastructure and applications are standardized and managed in organization significantly affects public outcomes.

ITG Awareness and Training- this practice refers to the campaigns to clarify the need of ITG to business and IT people

H10a: The degree to which ITG awareness and training is provided in organization significantly affects task outcomes.
H10b: The degree to which ITG awareness and training is provided in organization significantly affects organizational outcomes.
H10c: The degree to which ITG awareness and training is provided in organization significantly affects public outcomes.

Competitive IT Professionals- it involves human resources' knowledge, skills, competencies and acquaintance with organizational goals and public expectations.

H11a: The degree to which competitive IT professionals are attracted, developed and retained in organization significantly affects task outcomes.
H11b: The degree to which competitive IT professionals are attracted, developed and retained in organization significantly affects organizational outcomes.
H11c: The degree to which competitive IT professionals are attracted, developed and retained in organization significantly affects public outcomes.
Performance Measures & Benchmark- this practice refers to the measuring and reporting IT projects' efficiency & effectiveness and their contribution toward organizational goals and public expectations. It involves tracking and monitoring IT projects & operations and IT strategy.

H12a: The degree to which active performance measures and benchmarks are applied in organization significantly affects task outcomes.
H12b: The degree to which active performance measures and benchmarks are applied in organization significantly affects organizational outcomes.
H12c: The degree to which active performance measures and benchmarks are applied in organization significantly affects public outcomes.

Task outcomes- these are referred to as project's efficiency and effectiveness. Efficiency is a measure of amount of work produced, cost and schedule adherences and overall efficiency of operations whereas effectiveness is a measure of quality of work and ability of project to meet its goals [19].
Organizational outcomes- these are referred to as the benefits that a project provides to the host organization e.g. cost reduction and efficiency gains; improved quality of decision-making [20].
Public outcomes- these are referred to as the benefits that a project provides to citizens, businesses and employees e.g. cost and time saved using e-services [21], better informed, knowledgeable about government policy [22] etc.

4.2 The Population and Sample

The study population contained fully or partially completed IT projects in Ministries, Departments & Agencies (MDAs). The projects were mainly public datacenters, database and registration systems; e-filing, e-tax and e-billing systems; driving licensing and vehicle registration systems; land record management systems; hospital management systems; disaster management systems; monitoring and evaluation related e-systems; e-recruitment/procurement systems; online education systems and other academia related e-systems. The sampling frame was the Public Sector Development Programs (PSDPs) of last 12 years at federal and provincial levels. Due to the context of the study, random sampling technique was applied to select right projects and respondents. The unit of analysis was individuals, mainly IT executives, IT and project directors, managers and coordinators knowledgeable and well-versed in managing public sector IT projects. It also included key project users in some cases who remained involved in project implementation phase and shifted in operation phase after projects' completion. A total of 200 questionnaires were distributed by hand and through emails. The data collection process was commenced in December, 2015.

4.3 Operational Measures

Whenever possible, we used existing and previously validated scales. However, some questions were slightly modified. All the scales were discussed with two IT experts having rich experience in managing public sector

IT projects. Their recommendations were incorporated in the final questionnaire. The items of scale for 12 ITG practices were adopted from Nfuka and Rusu [23] and Keil et al. [24] and measured on five point Likert scale, 1 (strongly disagree) to 5 (strongly agree). The items of scale for task outcomes were borrowed from Henderson and Lee [19] and measured on seven-point Likert scale, 1 (extremely low) to 7 (extremely high). The items of scales for organizational and public outcomes were used from the existing literature and resulted in self-constructed scales. The items for both scales were measured using seven-point Likert scales, 1 (strongly disagree) to 7 (strongly agree).

4.4 Data Analysis

The analysis was based on the research model (Figure 1) and PLS-based structural equation modeling. The PLS is a variance-based structural equation modeling technique useful for testing relationships within a structural model to ensure statistical conclusion validity [25].

5. Results

5.1 Sample Characteristics

A total of 104 completed questionnaires were returned by the respondents out of 200 sent out. This also included those that were received after sending two reminders to the non-respondents of first and second rounds. In this way, the response rate is 52 percent. The distribution of respondents based on their role, experience & qualification is given in Table 1. It shows that 18 were senior IT executives, 30 were Director/Deputy Director (IT), 40 were Project Director/Manager/Coordinator and 16 were key project users. Table 1 also shows the respondents' experience in using and managing IT which was above five years on average and familiarity with ITG was at level four on a five point Likert scale. As for as academic qualification of the respondents is concerned, 66 were master degree holder, 30 had bachelor degree and 8 were below the bachelor degree. The non-response bias was tested by comparing early and late responses against key sample characteristics i.e. respondents' demographics (academic qualification, role in the organization, and experience in managing IT and IT projects and familiarity with ITG). The results indicated no significant differences.

Table 1: Sample characteristics

	Frequency	Percentage
Role in organization (n=104)		
Senior IT executives	18	17.30
Directors/Deputy Directors (IT)	30	28.85
Project Directors/Managers/Coordinators	40	38.46
Key project users	16	15.39
*Experience**	Median	
Experience of managing IT in general	5	
Experience of managing IT projects	5	
Familiarity with ITG	4	
Qualification		
Master degree	66	
Bachelor degree	30	
Others	8	

Note: *On a five-point Likert scale (1 – not at all, 5 – beyond five years); (1 – not at all, 5 – to a great extent)

5.2 Testing the Measurement Model

The measurement model was tested through convergent and discriminant validity. Convergent validity is tested through indicator reliability (item loading), internal consistency reliability (composite reliability), AVE, Cronbach's alpha coefficient and t-value of outer loading. Table 2 shows the values of these measurements emerged from the data. The lowest item loading is 0.638 which is above the minimum required value of 0.4 [26]. The composite reliability is in range 0.818-0.952, AVE is in range 0.531-0.848 and Cronbach's alpha is in range 0.718-0.937 which all are above the minimum thresholds of 0.5, 0.5 and 0.7 respectively [27]. The t-values of outer loading for all indicators are also greater than 1.96 at 5% significant levels which are not shown in Table 2.

Discriminant validity was tested by the criteria provided by Fornell and Larcker [25] i.e. square root of AVE between constructs and its measures is ≥ to other constructs. Table 3 shows that discriminant validity is established because the square root of AVE between constructs and its measures is greater than the corresponding inter-correlations.

Table 2: Measurement of constructs and indicators (with reliabilities)

Latent Construct	Factor loading	Composite reliability	AVE	Cronbach's alpha
V1 (3 items)	0.892-0.907	0.911	0.774	0.854
V2 (4 items)	0.740-0.785	0.854	0.593	0.777
V3 (5 items)	0.863-0.904	0.946	0.777	0.929
V4 (3 items)	0.915-0.920	0.941	0.842	0.907
V5 (5 items)	0.880-0.912	0.951	0.795	0.936
V6 (5 items)	0.865-0.908	0.950	0.791	0.934
V7 (5 items)	0.876-0.916	0.952	0.799	0.937
V8 (3 items)	0.868-0.886	0.911	0.774	0.854
V9 (3 items)	0.875-0.923	0.926	0.806	0.879
V10 (3 items)	0.914-0.928	0.944	0.848	0.911
V11 (3 items)	0.854-0.896	0.908	0.767	0.848
V12 (4 items)	0.638-0.800	0.818	0.531	0.718
Task outcomes (7items)	0.671-0.780	0.890	0.536	0.856
Organizational outcomes (6 items)	0.704-0.864	0.912	0.635	0.884
Public outcomes (5 items)	0.709-0.856	0.885	0.607	0.836

5.3 Testing the Structural Model and Hypotheses

The structural model is used for hypotheses test. It is tested through variance (R^2) and path coefficients and their significance. We calculated the effect of 12 ITG practices on task, organizational and public outcomes in one step instead of three separate steps. The variance (R^2) and strength & significance of path coefficients are shown in Table 4. As given in Table 4, 83.5 percent variance in task outcomes, 56.6 percent variance in organizational outcomes and 81.1 percent variance in public outcomes can be explained by 12 ITG practices which are above the cutoff value of 50 percent [26]. The path coefficient strength (γ) and significance (t-value) generated by Smart PLS bootstrapping with 5000 samples are given in Table 4.

The practice with most positive effective is *"IT/business Communication and Partnership"*. It demonstrates positive support for all three success attributes i.e. task outcomes (γ = 0.263, t = 6.049), organizational outcomes (γ = 0.211, t = 2.973) and public outcomes (γ = 0.315, t = 5.646). Therefore, H3a, H3b and H3c are supported. Two more practices with relatively higher positive effect are *"Engagement of Key Stakeholders"* and *"IT Leadership"*. The former indicates positive support for task outcomes (γ = 0.245, t = 5.363) and public outcomes (γ = 0.233, t = 4.678). Hence, H4a and H4c are supported. The latter also indicates positive support for task outcomes (γ = 0.244, t = 5.531) and public outcomes (γ = 0.249, t = 4.178). Therefore, H1a and H1c are also supported.

The practice *"Senior Management Involvement and Support"* indicates small positive support for task outcomes (γ = 0.187, t = 4.247) but its higher significance shows its importance. Hence, H2a is supported. However, *"Competitive IT Professionals"* indicates smallest support for task outcomes (γ = 0.120, t = 2.622). Hence, H11a is weakly supported.

Moreover, the practices *"Defined, Aligned and Cascaded IT and Business Strategies"* and *"Policies and Guidelines for Optimal Acquisition and Use of IT"* show positive support for organizational outcomes (γ = 0.226, t = 3.397 and γ = 0.209, t = 4.170 respectively). In this way, H5b and H7b are supported.

Furthermore, *"IT Structures for Responsiveness and Accountability"*, *"IT Governance Training and Awareness"* and *"Performance Measures and Benchmarks"* reveal small positive support for organizational outcomes (γ = 0.162, t = 2.659, γ = 0.173, t = 2.174 and γ = 0.154, t = 2.125 respectively). Hence, H6b, H10b and H12b are weakly supported.

The practice *"Standardized and Managed IT Infrastructure and Applications"* show positive support for public outcomes (γ = 0.256, t = 4.697). Therefore, H9c is supported. However, *"Risk Identification and Mitigation Mechanism"* indicates no significant support for any of the success attributes in the studied environment.

6. Discussion

The results presented in the previous section indicate that majority of the studied ITG practices (11 out of 12) had small to moderate effect on either task, organizational and/or public outcomes. The practice *"IT/business Communication and Partnership"* is the most important in the whole study. It showed positive effect on task, organizational and public outcomes. This might be due to the fact that most PakPSOs have IT project steering committees with a balanced representation of both business and IT personnel besides a central IT steering committee at their respective planning sector organizations. They have also newly established cross-training and communication mechanisms in place to encourage this practice at employees' level.

The practice *"IT Leadership"* showed positive effect on task and public outcomes. However, this practice showed no support for organizational outcomes. It means PakPSOs are still lacking in providing leadership structures and related competencies for organizational outcomes. One possible reason might be the fact that PSOs are usually weak in setting goals and measuring performance at organizational level [2] and possibly IT leadership in PakPSOs undertakes IT projects in isolation i.e. without properly aligning them with organizational objectives.

The practice *"Senior Management Involvement and Support"* indicated positive effect on task outcomes.

Table 3: Inter-correlation of constructs and the corresponding square root of AVE

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12
V1	**0.880**											
V2	0.581	**0.770**										
V3	0.217	0.425	**0.881**									
V4	0.655	0.603	0.358	**0.918**								
V5	0.431	0.482	0.359	0.470	**0.892**							
V6	0.333	0.346	0.121	0.434	0.412	**0.889**						
V7	0.390	0.396	0.189	0.508	0.366	0.253	**0.894**					
V8	0.506	0.546	0.290	0.611	0.503	0.378	0.511	**0.880**				
V9	0.524	0.576	0.438	0.622	0.490	0.450	0.549	0.530	**0.898**			
V10	0.528	0.557	0.575	0.613	0.451	0.356	0.479	0.537	0.591	**0.921**		
V11	0.503	0.531	0.419	0.606	0.612	0.494	0.505	0.600	0.638	0.563	**0.876**	
V12	0.565	0.502	0.265	0.528	0.421	0.567	0.336	0.344	0.486	0.433	0.458	**0.729**

Table 4: Strengths and significance of path coefficients

	Task outcomes ($R^2 = 0.835$)			Organizational outcomes ($R^2 = 0.566$)			Public outcomes ($R^2 = 0.811$)		
Constructs	Path coeff. (γ)	t-values (t)	Hypothesis Support	Path coeff. (γ)	t-values (t)	Hypothesis Support	Path coeff. (γ)	t-values (t)	Hypothesis support
V1	0.244	5.531	Supported	-0.028	0.378	Not supported	0.249	4.178	Supported
V2	0.187	4.247	Supported	-0.059	0.995	Not supported	0.034	0.876	Not supported
V3	0.263	6.049	Supported	0.211	2.973	Supported	0.315	5.646	Supported
V4	0.245	5.363	Supported	0.049	0.577	Not supported	0.233	4.678	Supported
V5	0.023	0.535	Not supported	0.226	3.397	Supported	0.019	0.409	Not supported
V6	0.097	2.448	Not supported	0.162	2.659	Supported	0.060	1.523	Not supported
V7	0.057	1.582	Not supported	0.209	4.170	Supported	0.050	1.472	Not supported
V8	0.067	1.445	Not supported	-0.013	0.213	Not supported	0.076	1.737	Not supported
V9	0.006	0.156	Not supported	-0.049	0.823	Not supported	0.256	4.697	Supported
V10	-0.012	0.309	Not supported	0.173	2.174	Supported	-0.033	0.578	Not supported
V11	0.120	2.622	Supported	0.044	0.697	Not supported	0.019	0.510	Not supported
V12	-0.045	1.169	Not supported	0.154	2.125	Supported	-0.063	1.262	Not supported

Note: Path coefficients (γ) ≥ 0.1 small support, ≥ 0.3 moderate support, ≥ 0.5 strong support [30]

This practice is also important because the role of senior management is crucial in resource prioritisation, provision of additional resources and support to the project in crisis. The need is enlarged in the context of a developing country due to limited resources, competing needs and strong political influence. However, this practice provided no support for organizational and public outcomes which is a surprising result of this study.

The practice *"Engagement of Key Stakeholders"* indicated positive effect on task and public outcomes. This finding is consistent with stakeholder theory that emphasises the need of involving inside and outside stakeholders for success [28]. However, this practice showed no effect on organizational outcomes in the studied environment which shows a major weakness of PakPSOs.

The practices *"Defined, Aligned and Cascaded IT and Business Strategies"* and *"IT Structures for Responsiveness and Accountability"* indicated positive effect on organizational outcomes. The former is consistent with the study of Bowen et al. [29] in which this practice found to be an effective indicator for IT outcomes success. The later is consistent with the study of De Haes and Van Gremergen [12] which highlights the need of IT structures for success. However, these practices indicated no effect on task and public outcomes. One possible reason might be the ineffectiveness and absence of IT strategies and policies in most of the PakPSOs. The poor strategic alignment is another reason for this to happen.

Similarly, the practices *"Policies and Guidelines for Optimal Acquisition and Use of IT"*, *"IT Governance Awareness and Training"* and *"Performance Measures and Benchmarks"* showed positive effect on organizational outcomes. However, these practices indicated no effect on task and public outcomes. This indicates that these practices are more important for organizational context and should be implemented in organizational context mainly rather than projects' contexts.

The practice *"Competitive IT Professionals"* indicated positive effect on task outcomes. However, this practice indicated no effect on organizational and public outcomes. This shows that PakPSOs mainly emphasise on IT professionals for task outcomes rather than organizational and public outcomes. Most of the time, IT professionals are hired on contract basis till the duration of the project. Attracting and retaining IT professionals is also a problem in PakPSOs due to higher salaries in multinational and private organizations.

The studied ITG practices showed a positive influence on public sector IT projects' success which shows the importance of ITG for IT projects. However, various practices demonstrated support for various attributes in the studied environment. Some indicated support for task outcomes and other indicated support for organizational and public outcomes with varying degree of effect. Due to the relative importance of these practices, public managers and decision-makers in PakPSOs and similar environment can improve their IT-related plans, prioritize & optimize limited resources and consequently, improve & sustain public service delivery.

7. Conclusion

The study explored ITG practices in terms of CSFs and their effect on IT projects' success in terms of task, organizational and public outcomes in the PSOs of a less developed country: Pakistan. A research model was developed and tested statistically using sample data from PakPSOs. Based on the data analysis approach i.e. PLS-based structural equation modeling, the studied ITG practices demonstrated small to moderate effect on IT projects' success. It happened even in the context of a less

developed country. This provides a foundation for implementing ITG practices at IT projects' level in this environment.

The study provides important implications for both practitioners and academia. From practitioners' point of view, the study provides guidance for public managers on prioritizing limited resources and improving related IT plans. The study also contributes to the existing body of knowledge from academicians' point of view. The results may be used to broaden the scope of effective ITG practices in similar context.

References

[1] Amanat Ali and Asim Nisar, "The Existing State of IT Governance Maturity in the Public Sector Organizations of a Less Developed Country: A Case of Pakistan," International Journal of Advance Computational Engineering and Networking , vol. 3, no. 11, pp. 26-34, 2015.

[2] Gad J Selig, Implementing IT Governance: A Practical Guide to Global Best Practice in IT Management. New York: Van Haren Publishing, 2008.

[3] Peter Weill and Jeanne W Ross, *IT Governance: How Top Performers Manage IT Decision Rights for Superior Results*. Boston: Harvard Business School Press, 2004.

[4] Jan-Erik Lane, *The Public Sector: Concepts, Models and Approaches*, 3rd ed.: SAGE PUBLICATIONS, 2000.

[5] Qiang Liu and Gail Ridley, "IT Control in the Australian Public Sector: An International Comparison," in *Thirteenth European Conference on Information Systems*, 2005.

[6] J F Rockart, "Chief Executives Define their Own Data Needs," *Harvard Business Review*, vol. 57, no. 2, pp. 81-93, 1979.

[7] J Esteves, "Definition and Analysis of Critical Success Factors for ERP Implementation Projects," *Doctoral Thesis, Universitat Polite`cnica de Catalunya, Barcelona*, 2004.

[8] Jerry N Luftman, Raymond Papp, and Tom Brier, "Enablers and Inhibitors of Business-IT Alignment," *Communications of the Association for Information Systems*, vol. 1, no. 11, 1999.

[9] S Teo and J Ang, "Critical Success Factors in the Alignment of IS Plans with Business Plans," *International Journal of Information Management*, vol. 19, pp. 173-185, 1999.

[10] E Guldentops, "Key Success Factors for Implementing IT Governance: Let's Not Wait for Regulators to Tell Us What to Do," *Information Systems Control Journal*, vol. 2, 2004.

[11] ITGI, *Board Briefing on IT Governance*, 2nd ed., 2003.

[12] S De Haes and W Van Grembergen, "An Exploratory Study into the Design of an IT Governance Minimum Baseline through Delphi Research," *Communications of the Association of the Information Systems*, vol. 22, no. 24, pp. 443-458, 2008.

[13] Wui-Gee Tan, Aileen Cater-Steel, and Mark Toleman, "Implementing Centralised IT Service Management: Drawing Lessons from the Public Sector," in *18 th Australasian Conference on Information Systems* , Toowoomba , 2007.

[14] Edephonce N. Nfuka and Lazar Rusu, "Critical Success Factors for Effective IT Governance in the Public Sector Organizations in a Developing Country: The Case of Tanzania," in *18th European Conference on Information Systems*, 2010.

[15] N Agarwal and U Rathod, "Defining 'Success' for Software Projects: An Exploratory Revelation," *International Journal of Project Management*, vol. 24, pp. 358-370, 2006.

[16] W M Han and S J Huang, "An Empirical Analysis of Risk Components and Performance on Software Projects," *The Journal of Systems and Software*, vol. 80, pp. 42-50, 2007.

[17] Adel M Aladwani, "An Integrated Performance Model of Information Systems Projects," *Journal of Management Information Systems*, vol. 19, no. 1, pp. 187-212, 2002.

[18] John Campbell, Craig McDonald, and Tsholofelo Sethibe, "Public and Private Sector IT Governance: Identifying Contextual Differences," *Australasian Journal of Information Systems*, vol. 16, no. 2, 2010.

[19] J C Henderson and S Lee, "Managing I/S Design Teams: A Control Theories Perspective," vol. 38, no. 6, pp. 757-777, 1992.

[20] Shirley Gregor, Michael Martin, Walter Fernandez, Steven Stern, and Michael Vitale, "The Transformational Dimension in the Realization of Business Value from Information Technology," *The Journal of Strategic Information Systems*, vol. 15, no. 3, pp. 249-270, 2006.

[21] D Gilbert, P Balestrini, and D Littleboy, "Barriers and Benefits in the Adoption of E-government," *International Journal of Public Sector Management*, vol. 17, no. 4, pp. 286-301, 2004.

[22] A Kolsaker and L Lee-Kelley, "Citizens' Attitudes towards E-government and E-governance: A UK Study," *International Journal of Public Sector Management*, vol. 21, no. 7, pp. 723-738, 2008.

[23] Edephonce N. Nfuka and Lazar Rusu, "The Effect of Critical Success Factors on IT governance Performance," *Industrial Management and Data Systems*, vol. 111, no. 9, pp. 1418-1448, 2011.

[24] M Keil, PE Cule, K Lyytinen, and RC Schmidt, "A Framework for Identifying Software Project Risks," *Communication ACM*, vol. 14, no. 2, pp. 76-83, 1998.

[25] C. Fornell and D. Larcker, "Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research*, vol. 18, no. 1, pp. 39-50, 1981.

[26] Joseph F. Hair, Bill Black, Barry Babin, Rolph E. Anderson, and Ronald L. Tatham, *Multivariate Data Analysis*, 6th ed.: Prentice Hall, 2006.

[27] D Gefen and D Straub, "A Practical Guide to Factorial Validity Using PLS-Graph: Tutorial and Annotated Example," *Communications of the Association for Information Systems*, vol. 16, no. 25, pp. 91-109, 2005.

[28] R E Freeman, "Strategic Management: A Stakeholder Approach," *Pitman, Boston, MA*, 1994.

[29] Paul L. Bowen, May-Yin Decca Cheung, and Fiona H. Rohde, "Enhancing IT Governance Practices: A Model and Case Study of an Organization's Efforts," *International Journal of Accounting Information Systems*, vol. 8, pp. 191-221, 2007.

[30] J Cohen, *Statistical Power Analysis for the Behavioural Sciences*, 2nd ed.: Lawrence Erlbaum Associates, 1988.

Author Profile:

Amanat Ali did his MSc in Electronics from Quaid-I-Azam University, Islamabad and MS in Engineering Management from Center for Advanced Studies in Engineering (CASE). Islamabad. He has more than 10 years of experience in managing public sector IT projects. He is currently a PhD student at CASE, Islamabad.

Asim Nisar did his PhD from Asian Institute of Technology, Thailand. His major areas of interest are: IT governance, IT policy, MIS ERP implementation and project management.
.x