



## PORTFOLIO MANAGEMENT AND IT GOVERNANCE: AN EMPIRICAL INVESTIGATION USING PLS PATH ANALYSIS

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### ABSTRACT

*This research investigates IT Governance concepts, and its role in enhancing IT portfolio management in Jordanian public sector organizations. Quantitative method is adopted for answering the research questions. Factor analysis and PLS path analysis was utilized to analyze the collected data of a field survey of 26 organizations in Jordanian public sector. Findings show that there is a direct relationship between IT Governance and IT Portfolio Management Pillars; the Technique to Execute Organization Strategy (PMSE), Optimizing Resource Allocation across Projects (PMOS), Projectification of Business Strategy (PMPS), and Risk Balance (PMRB).*

**Keywords:** *IT Governance, IT Portfolio Management, Resource Allocation, Organization Strategy, Risk Balance*

### INTRODUCTION

With the significant increase in the development and use of information technology which becomes the main enabler in achieving goals of organizations, and with the rapid use of the e-government concepts nowadays, IT Governance becomes very essential concepts to govern the processes in e-government and to be in harmony with the corporate governance framework. E-government infrastructure alone not enough, it needs also interactions between all parties such as people, regulations, and technology, in order to build an effective and responsible e-government processes. Governance is an economic, political and administrative authority to manage a community's affairs at all levels. It comprises the mechanisms, processes and institutions through which community members and groups articulate their interests, exercise their legal rights, meet their obligations and mediate their differences (Somuah, 2004). Good implementation of IT Governance can enhance the following issues in the government organizations: accountability, transparency, participation, and predictability. According to Luftman et al. (2004) organizations that don't have a good IT governance model dissipate valuable resources, capital, time and human in an era where time is very important,

capital in shortage and talent people are rare. According to Finger and Rossel (2007) e-governance is not anew manner to talk about e-government, but it express another perspective. E-governance deal with the concerns, problems and ways for problem solving among different parties inside the organizations. There is a continuous and necessary readjustment between technological innovation, law and institutional acknowledgement. E-governance phenomenon is the co-evolution between technology (communication technologies in particular) and information from one side and institutions (particularly political institutions) on the other side. IT Governance system which work in harmony with corporate Governance model considered as an important tool which can be used to enhance the IT Portfolio Management discipline in the organizations. IT Portfolio Management is a new concept which mange number of projects at the same time. Also it's necessary to prioritize different projects in accordance to the organization corporate strategy.

### GOVERNANCE

Governance can be defined as the exercise of ethical corporate behavior by directors or others in the wealth-creation process, as part of how



they provide stewardship over the business of the entity. Governance was defined as “ A set of responsibilities and practices exercised by the board and executive management with the goal of providing strategic direction, ensuring that objectives are achieved, ascertaining that risks are managed appropriately and verifying that enterprise’s resource are used responsibly” (IT Governance Institute, 2005). The organization for Economic Co-operation and Development (OECD, 2008) defines corporate governance as a set of interaction between business management, board of directors, shareholders, and stakeholders. Good governance should allow effective monitoring and effective use of organization resources. The Bank of International Settlements (BIS) define the governance arrangements in Enhancing Corporate Governance in Banking Organizations as surrounding the relationship between management team and governing team to provide the governing structure to achieve the following objectives:

- The entity’s general objectives.
- The ways of achieving those objectives.
- The methods in which performance will be monitored.

Governance is the responsibility of the board of directors to ensure that all resources, including information technology, keep up and extend the organization's strategies and objectives.

### IT GOVERNANCE

IT Governance is an expression used to explain the use of organizational processes to make decisions about how to get and deploy IT resources and competencies (Henderson and Venkatraman, 1993). According to IT Governance Institute (2003) *"IT governance is the term used to describe how those persons entrusted with governance of an entity will consider IT in their supervision, monitoring, control and direction of the entity. How IT is applied within the entity will have an immense impact on whether the entity will attain its vision, mission or strategic goals"*.

Luftman et al. ( 2004) indicated that IT Governance answer the following questions:

- Who has the authority to make decisions (power).
- Why they make decisions (for alignment).
- How they make these decisions (decisions procedure).

Current organizations boundaries are more flexible, dynamic and extensive. Governance framework and criteria are critical in today’s business environment especially when the enterprise is global and extends to other entities. According to Henderson and Venkatraman (1993) e-governance is defined as" the use of information and communication technologies in public administrations to improve public services and democratic processes and to strengthen support to policies". IT governance is about assigning decision rights and creating an accountability framework that encourage desirable behaviors in the use of information and technology (Cameron, 2006). . According to Davies et. al ( 2007) the focus for electronic government research and practice has been changing over the years. In addition the increasing awareness that IT investment has to be expressed in terms of creating public value caused the change towards organizational issues, including the alignment of electronic government initiatives with the broad public sector development program. However, the availability of mature, cross-agency public services does not mean that such services will be automatically used and therefore how much public value has been really produced. According to this concept the focus has changed again, currently to social issues, and the area expanded from electronic government technology enabled enhancements in government operations, to electronic governance–technology-enabled enhancements in interactions between government and non government actors. Finger and Rossel (2007) argued that e-governance is not a new manner to talk about e-government, but it expresses another perspective. E-governance deals with the concerns, problems and ways for problem solving among different parties inside the organizations. There is a continuous and necessary readjustment between technological innovation, law and institutional acknowledgement. E-governance phenomenon is the co-evolution between technology (communication technologies in particular) and information from one side and institutions (particularly political institutions) on the other side. Globalization considered as a main reason for economic competitiveness and liberalization. ICTs come out to be a helpful answer facility for many investments and decision-making processes. ICT governance is very important for the future. IT Governance is part of corporate Governance and they should be aligned. According to IT Governance Institute (2003) the IT Governance framework starts from setting

objectives which should be achievable then the process of comparing these objectives starts after that IT activities which help in increasing automation, decrease the costs and managing

risks, finally measuring performance and make modification for objectives to enhance performance as shown in figure 1.

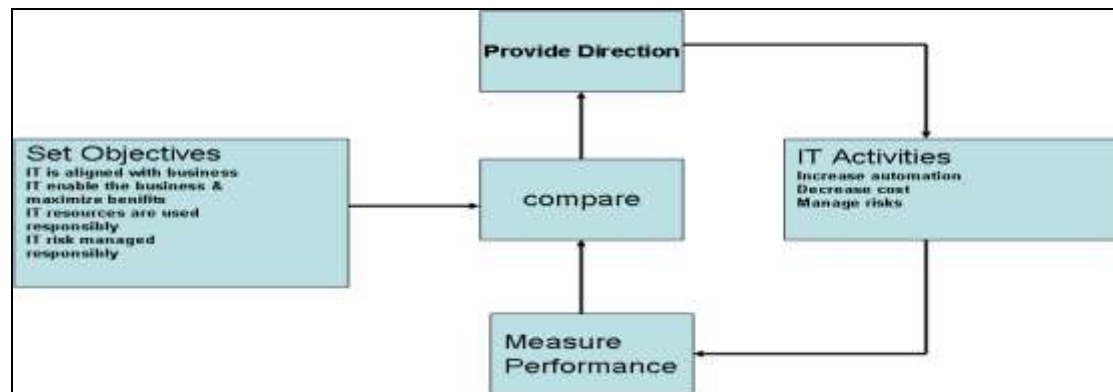


Figure 1: IT Governance Framework, Adapted from IT Governance Institute, 2003

IT governance, behave similarly as corporate governance actions, both board and executive are work closely, together in establishing directions and in controlling . The lower layers role in the organization are to give important information needed in decision-making and evaluation activities , also they help in evaluating performance measures.

### IT GOVERNANCE PILLARS

To summarize from previous studies and According to Asian Development Bank (1998) the most important pillars of governance are the followings: accountability, transparency, predictability, Participation. In the following sections there will be a brief description about each one of the pillars and its importance as follows:

#### ACCOUNTABILITY (ACC)

Accountability is the ability to receive answers about questions such as about the decisions that have been taken and an interpretation about these decisions. Mulgan (2000), indicated that Accountability is a concept which should be determined in context: *who* is accountable *to whom* and *for what?* (Scott. C, 2000). According to Kim et al. (2005) the Sixth Global Forum describes that: There are an agreement of opinions had formed around reinventing governance rather than reinventing government. Through the existence of networks governments, private sectors, organizations and citizens form a web of relations. In past governance had the same meaning as government but currently with new

models of governance, government considered as one of the actors in this model. In other words, although the past form of governing was based on authoritarian states and hierarchical structures. Today governance is based on participatory policy making and a vast network comprising diverse actors. The meaning of Accountability has been extended to openness and transparency initiatives which intend to make both the control of government by the population and public discussion between citizens and governments easier (Mulgan, 2000). ICTs considered as an influential tool to enhance control and transparency and to associate people, organizations, information and knowledge. There is an ambition that information and communication technologies (ICTs) will enhance the openness, transparency and accountability of public administrations and bringing people to be closer to governments. Consequently, e-government is considered as a positive channel for enhancing trust in governments (La Porte M. et al., 2000).

#### TRANSPARENCY (TRA)

According to Balkin (1999) Transparency divided into three types: informational transparency, participatory transparency, and accountability transparency. Rawlins (2006) argued that transparency is consists of four factors substantial information, participation, accountability, and secrecy (which had a reverse meaning to openness). In an economic context, a useful definition of transparency is the presence of symmetric information; lack of transparency refers to asymmetric information. The goal of any



new corporate governance is to increase the transparency, and this process costs and benefits. The relationship between governance and transparency is obvious in the publics and regulators opinion; transparency was increased for the purpose of improving governance (Benjamin et al., 2007). The most important advantage of transparency is that it reduces asymmetric information, and also reduces the cost of trading the organization's securities and the organization's cost of capital (Diamond Douglas and Verrecchia., 1991). Costs of disclosure, as well as the competitive costs are important because the disclosure gives helpful information to product-market competitors (Leuz and Pwyssocki., 2006). Transparency that organizations need to be applied is part of the public transparency. According to Paul Sturges (2004) the major components of public transparency are:

- Open government and public scrutiny
- Freedom of information laws
- Protection of public interest disclosure
- Financial accountability and auditing

#### **PARTICIPATION (PAR)**

Friedman (2006) argued that Participatory governance is illustrated as a regulatory framework which is used to run public affairs and it is not exclusively assigned to government and the public administration, but also engage in co-operation between state institutions and civil society groups. It is noticed that the participation of people in giving feedback, making policy in order to make suitable decisions is very important in any organization. According to Robin Mansell (1998) ICTs considered as a facilitators for participation. ICTs motivate people to enhance their job and achieve it in efficient manner. "*ICTs offer the potential for revolutionary changes in national and regional innovation systems*". ICTs not only facilitate information exchange, but they are expanding the process, inventing new methods of sharing ideas, and reducing the costs of collecting and analyzing information. Richard, Riehle. (2007) has mentioned three benefits for ICTs within the framework of governance:

- ICTs work in harmony with the developmental challenges and help in making good governance framework.
- ICTs are considered as an efficient method to reduce costs.
- ICTs can be used to improve the democratic process, make sure effective

participation and makes governments closer to their human.

ICTs in any organization can enhance employee performance allowing them to communicate with each other and with the organizations electronically such as using E-mails and other electronic media. According to Ermias Wondie (2007) Policymakers can allow organizations to work jointly through networks in order to share resources, skills, and services to compete with others in the global economy and fulfill the needs of their local communities. ICTs can be beneficial to build the rule of law with the aid of computerized databases, communications networks and channels, and GIS's. ICTs participate in Improving yield and reform of internal government administration Such as procurement, human resources, budgeting, planning, evaluation by helping to remove paper from the process or by facilitating coordination and consolidation of information. Also it can help in increasing accountability as well. ICTs can be used to make collaboration between different government departments and facilitate dialogs and remove differences between opposition parties.

#### **PREDICTABILITY (PRE)**

According to Asia group (1998) Predictability can be obtained from laws and regulations that are obvious, known previously, and uniformly and effectively enforced. When there is no enough predictability, it will make difficulties for public officials to plan for the provision of services and is an excellent reason for nonperformance. According to OECD (2008) the rule of law refers to the institutional procedure of setting, understanding and executing laws and other regulations. So decisions that government had taken should be in accordance to law, in order to make private firms and individuals protected from random decisions. Reliability and predictability are not accomplished by more specific the regulations. Effective implementation of individual regulations needs to be counterbalanced by administrative procedure legislation and external reviews of decisions. Reliability and predictability also require certain degree of political stability and try to encourage private sector and convince them that their investments aren't depend on political uncertainty. Transparency and predictability are a matter of concern of investors and governments in order to keep privacy of sensitive information, so regulatory objectives and practices should be



made transparent in order to increase the predictability of outcomes.

### **IT PROJECT MANAGEMENT**

IT can be classified as either systems that address day-to-day operations or project-specific initiatives" (Fernandes, et., al, 2015; Chandler, 2002). Project management was defined by turner (1996)" as the art and science of converting vision into reality". According to Standish group (2003) Project management is a defined method used to manage key attributes about a project, include scope time, cost, quality, communication, risk, human capital, procurement and integration. There is a hierarchical relationship between strategy, portfolio management and project management (poskela et.al, 2001). Referring Project Management Institute (2000) project defined as "a temporary endeavor undertaken to create a unique product or service. Projects differ from ordinary operations in which they have a determined beginning and end, also their product is unique, but they still have common traits with routine operations in which both need resources as input and produce output."

IT project management guarantee that projects give the anticipated results in the defined time and budget, but IT project alone doesn't guarantee that a company is spending its resources in the suitable scope and executing the suitable projects (Cameron, 2006).

### **IT PORTFOLIO MANAGEMENT**

According to Sommer (1998) mentioned that any companies that funds, manages and assigns resources for two projects and above has been practicing a project portfolio whether it knows or not. In the majority of companies, portfolio management considered as a metaphor for prioritizing projects (Cooper & Edgett, 2000). IT portfolio management (ITPM) is a set of managed technology resources, process investments, individual capital resources and project investments related to business strategies according to an optimal mix depending on assumptions about future performance (Benko & McFarlan, 2003). ITPM is essential because many companies have more project initiatives than they have physical or financial resources to accomplish them (Archer & Ghasemzadeh, 1999). One of the most benefit of ITPM, it modifies IT strategy from traditional manner to sense and respond strategy, All projects of the companies put in the same repository after that

comparison between them, choice and prioritizing referring to risk and reward is done. ITPM considered being both an analytical way used to assess investments and a managerial instrument used to prioritize and assign IT resources (Cameron, 2006).

### **IT PORTFOLIO MANAGEMENT PILLARS**

Referring to Anell & Jensen (1998) portfolio management pillars considered as followings:

#### **TECHNIQUE TO EXECUTE ORGANIZATION STRATEGY (PMSE)**

According to Ansoff (1987) strategy is the broad collection of decision rules and guidelines that define a business scope and growth direction. Strategy is the pattern of objectives, purposes or goals and major policies and plans for achieving those goals, stated in such a way as to define what business the company is in, or is to be in, and what kind of company it is, or is to be (Christensen, 1982). According to Luftman et al. (2004) When any organization want to build a strategy there are three key elements should be taken into consideration : The first element is vision, it should be concise, measurable statement of where the company wants to go and what aspires to be. The second element is strategy and strategic objectives; it should describe how we will achieve this vision. The third element is the mission, it should answer the question what are we. According to Luftman et al., (2004) IT Strategy is a set of decisions made by IT and senior management Deployment of technology infrastructures Relationship of technology choices to business choices. Strategy execution is concerning on the managerial exercise of supervising the organization strategy, making it work, improving the capability with which it is executed, and showing considerable progress in reaching the targeted results (Gary & Karla, 2009). Balanced scorecard considered one of the most practical methods that used to execute strategy in a suitable way, part of these enhancements, a tool called a strategy map, which is considered as one of the most effective mechanisms for developing a clear, crisp roadmap of an organization's strategic intent (Kaplan and Norton, 2000). Strategy execution is considered as one of the more difficult problems in business, creating a good strategy is nothing compared to executing it successfully. It is easier to build a strategy document than to get people



familiar with it (Davenport, 2007). Organization strategy should have clear strategic imperatives in place, appropriately communicated across all departments, to which the PPM goals are to be aligned (Lycett et al., 2004). There is no doubt that ITPM can be a successful instrument for applying strategic plans (Tamara T. and Müller, R., (2015); Roberts & Gardiner, 1998). According to Bonham (2004) the significant use of ITPM is for communication of the fundamentals of the IT portfolio in business structure. The main objective of IT and systems strategic planning is a complete alignment of IT with business strategy (Lee, 1991). Referring to Heldey (1997) Strategic planning, ITPM, and project management must be aligned with each other. The alignment of business strategy and IT investments is not successful without the bond between strategic planning, portfolio management and project management. The alignment that is needed is applying IT in a suitable and timely way, in harmony with business strategies, goals and requirements and it will remain a key concern of business executives (Papp, & Rayner, 1998).

#### **OPTIMIZING RESOURCE ALLOCATION ACROSS PROJECTS (PMOS)**

Organizations and their IT projects have different types of resources one of them are human resource which comprise of people who are professional in IT and had gained experience. According to Jeffery, & Leliveld (2003), It is very important to have a project team with relevant finance and strategy skills. IT professionals should have enough knowledge to estimate the Net Present Value (NPV) or Return on Investment (ROI) of a project. Referring to Goldman (1999) four types of constraints should be managed: scarce human resources, staff capabilities, budgets and infrastructure. By the time Experience and IT skills that workers gained during their work in organizations, become knowledge. Organizations should find efficient ways to manage their human resources and take benefit of them in different projects that their organizations intend to do. Luftman et al (2004) mentioned that the management of information technology (IT) experts is a significant issue. The technique that IT organizations manage their IT professionals is clear in implementation of human resource management (HRM) practices. Agarwal, & Ferrat (2007). argued that it is clear that information technology (IT) plays an important role in developing current organizations and their economy and not only helps them in achieving

operational excellence, but also in assisting in strategic competitive advantage. Another type of resources is the technology resources which consist of software and hardware. Organization should take benefit of this resource and share them across different projects. According to Kabeh Vaziri et al. (2005) the first in planning for project success is how to allocate and optimize resources even if it is a service delivery or software projects in order to finish the project with the schedule and budget that were dedicated by organization. Optimization of IT projects should be adopted as inter active review process to optimize the project portfolio in the presence of different goals (Luehrman, 1998). Recent information and communication technology (ICT) is assisting organizations not only to continue to exist but also help all organizations whatever their objectives to use ICT in order to enhance their operations (Turner, 1996).

#### **PROJECTIFICATION OF BUSINESS STRATEGY (PMPS)**

The process of choosing projects in order to make a portfolio should concentrate on an issue that all areas of the organization's strategy are addressed and that the portfolio is well balanced (Goldman, 1999). Every project of an organization has requirements. According to IEEE Standard 1233-1998, IEEE Guide for Developing System Requirements Specifications, defines a well formed requirement as a statement that:

- States system functionality (a Capability)
- Can be validated
- Must be met or possessed by a system
- Solves a customer problem
- Achieves a customer objectives
- Is qualified by measurable Conditions and bounded by Constraints

IT projects are planned to meet business unit requirements which should be aligned with the corporate strategy that may be affected by the global markets explode and the increasing speed of information transfer, so corporate strategies have become much more flexible (Bonham, 2004). Organization's business strategy should have a clear objectives and it should be aligned with IT strategy. Also Projects selected by the company should be aligned with business strategy of the company (Cooper, & Edgett, 2000). According to Datz (2003) there are some benefits that organizations should gain from adopting project portfolio management (PPM) approaches as the followings: (1) maximizing the value of IT investments while minimizing risk,



(2) improving communication and alignment between IT and business leaders, and (3) encouraging business leaders to act as team players, allowing planners to allocate resources more efficiently and to terminate projects. Merna (2003) argued that it is not practical to begin a project with business strategy or objectives but the management can move into project mode to develop the project objectives. Project mode should start when the business objectives are emerging, the project should start when there is a group of project objectives. It is important to be aware of projects role in enhancing the performance of business and the role of business in enhancing projects which are considered as a part of general business and an essential part of the development, strategic view and maintaining of organization's competitiveness (Wikstro, 2005).

### RISK BALANCE (PMRB)

With the increasing development in technology, Organizations are making huge investments in information technology (IT) projects. Many of these projects are risky, because they do not meet original expectations of cost, time, or benefits. So organizations need to differentiate between risks that can be resolved by action and risks that need hedging (Kumar, 2002). According to Clemons, & Weber (1990) managing information technology (IT) investment risk can be accomplished by the following options deferral, piloting, outsourcing, abandonment, in order to achieve the balance through different types of risks. Portfolio management decides the specific mix of investments making the maximum return for a given level of risk. Portfolio management is a structured method to classify, evaluate, prioritize, buy and manage an organization's projects and resources such as hardware, software, human capital, processes. It helps in evaluating the risks and rewards of various investment options as they relate to stated strategic objectives, thus facilitating conflict resolution across stakeholder groups (Solomon, 2002). According to Sergio et al. (2005) the greatest positive impact of project portfolio management (PPM) can be noticed when organizations start to : (a) assess economic and technological risks at the portfolio level, (b) incorporate resource constraints in their decision making, and (c) explicitly look for risk diversification across the portfolio. According to McFarlan. (1981) management should also implement a risk-based approach to the selection and management of IT project portfolios. He

noticed that risk-unbalanced portfolios make an organization to suffer operational disruptions, or make gaps for competitors to step in. McFarlan.(1981) argued that, the most important reasons for project failure were "the failure to assess individual project risk and the failure to consider the aggregate risk of the portfolio of projects". A portfolio should not be selected according to only individual characteristics of the investments, but it should take into consideration the overall risk and reward of the portfolio. When investment interactions are taken into account, portfolios can be built within the anticipated return, but lower risk than when not taking into account the interactions (Markowitz., 1991)

### PROJECT RISKS

Kaplan & Norton (2000) mentioned that there are three sources of risks that projects may be assigned according to them: first type is the market risk; its scope is the external environment such as type of customers and size of market. The second type is the technology risk such as rapid technology change, lack of standards. The third type is the organizational risk such as amount of fund, cost of projects, project's fit with organization's strategy. According to Luftman et al. (2004) before we begin mitigating risk, we should know the type of risk if it is technology, organizational, market risk, or others. Each one of them has a particular method to deal with it.

#### (a) Technology Risk Mitigation

- Having experts or IT skills to help organization executives.
- Applying the technology which is known for the organization.
- Monitoring emergent technology and how to apply what necessary for organization.
- Attending conferences and reading specialized papers.
- Applying pilot projects.

#### (b) Organizational Risk Mitigation

- Protect sponsorship
- Sharing responsibility between business and IT management.
- Supervision of business stakeholder from the beginning of the project.
- Applying change management plan.

#### (c) Market Risk Mitigation

- Reduce the geographic scope of project.
- Documentation of user requirement.
- Build a customer knowledge base.

**RESEARCH MODEL AND HYPOTHESES**  
**THE RESEARCH MODEL**

According to the previous studies, IT Governance (ITG) and IT Portfolio Management (ITPM), researchers suggest and develop a model to indicate the relationship between these elements. In this study the researcher study how the IT Governance enhance the ITPM. In this research ITPM studied as a dependent variable from one side with the IT Governance as an independent variable. Some researchers study one or some of IT Governance (ITG) pillars. In this research a comprehensive study achieved which take into consideration the entire integrated IT Governance (ITG) pillars. They were searched as the independent variables as shown in figure 2 as follows: Accountability (ACC), Participation (PAR), Transparency (TRA), and Predictability (PRE). Also ITPM Pillars were studied. They were searched as the independent variables as follows: a Technique to Execute Organization Strategy (PMSE), Optimizing Resource Allocation across Projects (PMOS), Projectification of Business Strategy (PMPS), and Risk Balance (PMRB). Figure 2 shows our research model, which is divided into three sections: the first section discuss the relationship between IT governance from one side and its pillars accountability, transparency, participation, and predictability from another side. The second section discuss the relationship between IT Governance as an independent variable and the

ITPM as a dependent variable. The researchers select the Jordanian Public Sector and try to prove these relationships. The third section discusses the relationship between ITPM from one side and its pillars organization strategy execution, optimizing resource allocation across projects.

**Research Hypotheses**

- Hypothesis 1: There is a significant relation between IT Governance and Accountability.*
- Hypothesis 2: There is a significant relation between IT Governance and Transparency.*
- Hypothesis 3: There is a significant relation between IT Governance and Participation.*
- Hypothesis 4: There is a significant relation between IT Governance and Predictability.*
- Hypothesis 5: There is a significant relation between ITPM and organization strategy execution.*
- Hypothesis 6: There is a significant relation between ITPM and optimizing resource allocation across projects.*
- Hypothesis 7: There is a significant relation between ITPM and projectification of business strategy.*
- Hypothesis 8: There is a significant relation between ITPM and risk balance.*
- Hypothesis 9: There is a significant relation between IT Governance and IT Portfolio Management.*

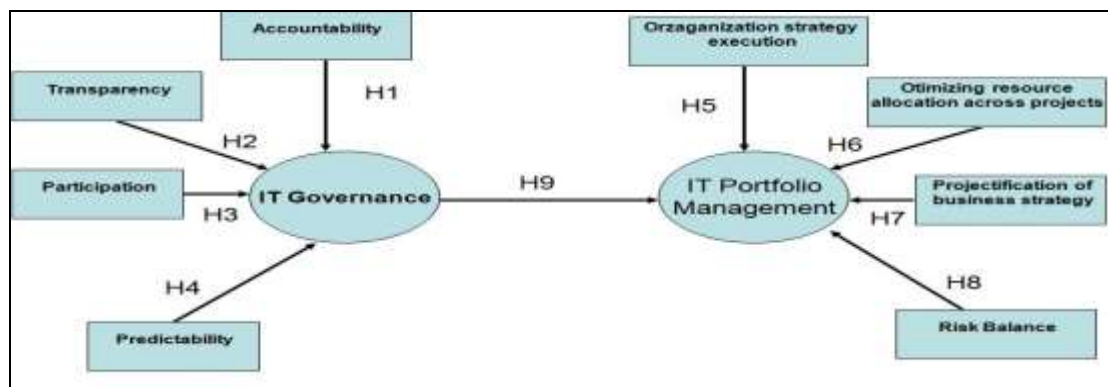


Figure 2: Research Model

**RESEARCH METHODOLOGY AND ANALYSIS**

To test the proposed research model, researcher adopted the survey method for data collection, and examined our hypotheses by applying the partial least squares (PLS) and path analysis method.

**Measurement and Data Collection**

We developed the items in the questionnaire either by adapting measures that had been validated by other researchers or by converting the definitions of constructs into a questionnaire format. Research approaches are divided into two major kinds: quantitative and qualitative which refer to the type of the data gathered and the investigation that is used on that (Yin, 1994). Research philosophy contains significant





suggestions about the way in which the world is viewed. These suggestions will show up the research strategy and the methods that should be chosen as part of that strategy (Saunders, M. et al., 2007). We use in our research quantitative approach, which consists of a survey about properties and variable and their relations; where features are classified, analyzed, and statistical models are constructed to justify what is observed. Quantitative research begins from a specified hypothesis that must be proved or disproved. According to Brown and Lloyd (2005) Quantitative Approach use large random samples that is representative of the general population. Quantitative analysis results can be generalized to a larger population and make the comparison of different attributes very easy (LAMEL, 2007). Researchers who apply logical positivism or quantitative research use experimental methods and quantitative measures to test hypothetical generalizations (Hoepfl, 1997). Also researchers emphasize the measurement and analysis of causal relationships between variables (Denzin and Lincoln, 1998). Quantitative methods collect numerical data and analyze it using statistical methods (Myers M.D, 1997). Quantitative approach usually uses a deductive approach where the authors build up a theory and hypothesis and design a research strategy to test the hypothesis (Saunders M. et al., 2007). According to Kruger (2003) quantitative approach permit to summarize large numbers of information sources and Capability comparisons across and over time.

### The Sample of the study

Enhancing the Jordanian public sector performance considered as one of the most important issues that government concentrate on Jordan consider one of the most active countries in the middle east that has a large evolution in the information technology, which is mainly used to enhance the quality of services that introduced through different types of agencies. Researcher chose in his study the Jordanian public sector as the target population because there are a lot of IT projects executed yearly in different type of organization, so it is suitable to investigate. Because the e-government in Jordan has a good infrastructure and go forward in advance steps in most organizations and their services, so it is very important to see also how IT Governance is vital in enhancing the public sector performance. There were 26 organizations had been chosen as samples for this study questionnaire was prepared in both English and Arabic languages and

distributed to the targeted people on these organizations. According to Yin (1994), the role of reliability is to minimize the error and biases in a study. Also Reliability refers to the extent to which your data collection techniques or analysis procedures will yield consistent findings (Saunders M. et al., 2007). Cronbach's alpha is one of the methods that used for measuring the consistency reliability (Saunders M. et al., 2007).

### OPERATIONALISATION OF THE INDEPENDENT VARIABLES OF THE RESEARCH MODEL

As indicated by Referring to some authors, whom they explained the importance of IT Governance (ITG) pillars and its importance in enhancing IT Portfolio Management in organizations. The researchers use in this phase SPSS tools to check the reliability of the data.

#### Accountability

The Factor analysis showed a one-factor solution of Accountability(ACC) construct, the loading factor range from 0.822 to 0.727 with average loading for the factor 0.775, this factor explains 60.180% of total variance, and the factor has eigenvalue greater than 1. The factor analysis demonstrate an obvious discriminate validity because all items are loaded on one factor, and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.836 which show that the sample is enough to achieve this test, reliability was calculated based on Cronbach's alpha, the measure was 0.83 which demonstrate a reasonable reliability for accountability.

#### Transparency

The Factor analysis for the refined items which have loading greater than 0.5 showed a one-factor solution of Transparency(TRA) construct, the loading factor range from 0.764 to 0.692 with average loading for the factor 0.629, this factor explains 53.31% of total variance, and the factor has eigenvalue greater than 1. The factor analysis demonstrate a obvious discriminate validity because all accepted items are loaded on one factor, and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.695 which show that the sample is enough to achieve this test, reliability was calculated based on Cronbach's alpha, the measure was 0.707 which demonstrate a reasonable reliability for transparency.



### Participation (PAR)

The Factor analysis showed a one-factor solution of Participation(PAR) construct , the loading factor range from 0.793 to 0.656 with average loading for the factor 0.712, this factor explains 50.964% of total variance, and the factor has eigenvalue greater than 1 .The factor analysis demonstrate an obvious discriminate validity because all items are loaded on one factor, and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.849 which show that the sample is enough to achieve this test, reliability was calculated based on Cronbach's alpha, the measure was 0.805 which demonstrate a reasonable reliability for participation. Table 3 shows the results of participation.

### Predictability (PRE)

The Factor analysis for the other 4 items which have loading greater than 0.5 showed a one-factor solution of Predictability(PRE) construct , the loading factor range from 0.822 to 0.758 with average loading for the factor 0.796, this factor explains 63.454% of total variance, and the factor has eigenvalue greater than 1. The factor analysis demonstrate a obvious discriminate validity because all accepted items are loaded on one factor, and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.748 which show that the sample is enough to achieve this test, reliability was calculated based on Cronbach's alpha, the measure was 0.806 which demonstrate a reasonable reliability for PRE.

### Organization IT Strategy Execution (PMSE)

The Factor analysis showed a one-factor solution of IT strategy execution(PMSE) construct, the loading factor range from 0.78 to 0.69 with average loading for the factor 0.75, this factor explains 56.91% of total variance, and the factor has eigenvalue greater than 1. The factor analysis demonstrate an obvious discriminate validity because all items are loaded on one factor, and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.821 which shows that the sample is enough to achieve this test, reliability was calculated based on Cronbach's alpha, the measure was 0.808 which demonstrate a reasonable reliability for IT strategy execution.

### Optimizing Resource Allocation across Projects (PMOS)

The factor analysis demonstrate a obvious discriminate validity because all accepted items are loaded on one factor, and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.870 which show that the sample is enough to achieve this test, reliability was calculated based on Cronbach's alpha, the measure was 0.820 which demonstrate a reasonable reliability for PMOS.

### Projectification of IT strategy (PMPS)

The factor analysis demonstrate a obvious discriminate validity because all items are loaded on one factor, and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.779 which show that the sample is enough to achieve this test, reliability was calculated based on Cronbach's alpha, the measure was 0.802 which demonstrate a reasonable reliability for projectification of business strategy.

### Risk Balance (PMRB)

The factor analysis demonstrate an obvious discriminate validity because all items are loaded on one factor, and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was 0.874 which show that the sample is enough to achieve this test, reliability was calculated based on Cronbach's alpha, the measure was 0.838 which demonstrate a reasonable reliability for risk balance.

### PARTIAL LEAST SQUARES (PLS) PRODUCT INDICATOR APPROACH FOR MEASURING INTERACTION

The capability to find and precisely estimate the strength of interaction effects are significant concerns that are essential to social science research generally and for IS research in particular (Chin, W. et al., 1996). In IS discipline, a large number of research has been dedicated to investigate the conditions and contexts under which relationships may vary, often under the general umbrella of contingency theory (McKeen, Guimaraes, & and Wetherbe, 1994). The traditional methods such as analysis of variance (ANOVA) and moderated multiple regression (MMR) face problems resulting from measurement error and the low statistical power that can result from such error. Traditional techniques may not be able to detect interaction

effects. The problems that happened with the traditional methods are solved in this research by discussing a new latent variable modeling approach that can provide more precise estimates of interaction effects by accounting for the measurement error in measures which attenuates the estimated relationships (Chin et al., 1996). To solve difficulties that face traditional methods such effects of measurement error, researcher in this study use product indicator approach in conjunction with Partial Least Squares (PLS). The predictor, moderator, and dependent variables used with traditional methods, viewed with the PLS method as latent variables (i.e., constructs) which cannot be measured directly. in PLS product Each set of indicators reflecting their underlying construct (i.e., latent variable) then submitted to PLS for estimation resulting in a more accurate assessment of the underlying latent variables and their relationships. According to (Chin W. and Gopal A., 1995) The PLS procedure become a well-known and use among IS researchers in recent years because of its ability to model latent constructs under conditions of non-normality and small to medium sample sizes. PLS is similar to regression as a components-based structural equations modeling technique, but simultaneously models the structural paths (i.e., theoretical relationships among latent variables) and measurement paths (i.e., relationships between a latent variable and its indicators). Rather than assume equal weights for all indicators of a scale, the PLS algorithm

allows each indicator to vary in how much it contributes to the composite score of the latent variable (Chin,W. et al., 1996) indicators with weaker relationships to related indicators and the latent construct are given lower weightings. In this sense, PLS is more preferable than other techniques such as regression which assume error free measurement (Lohmöller, 1989). PLS is considered as a suitable technique for explaining complex relationships (Fornell C. and Yi, 1992). According to Chin (1998) PLS was used as technique which allows latent constructs to be modeled either as formative or reflective indicators. Additionally it makes minimal demands in terms of sample size to validate a model compared to alternative structural equation modeling techniques. The researcher use in the analysis a tool called SmartPLS 2.0 project which is located at the school of business at the University of Hamburg in Germany. SmartPLS 2.0 can be used in business research for the creation of path model and the measurement using partial least square approach. SmartPLS 2.0 redesigned to use java Eclipse platform technology. SmartPLS allows creating and measuring a path model and evaluating the results. As indicated by Ringle, & Wende, (2005) there is also additional functionalities can easily add them to the SmartPLS 2.0 java Eclipse Plugins (All results of SmartPLS 2.0 that made to this research are shown in figure

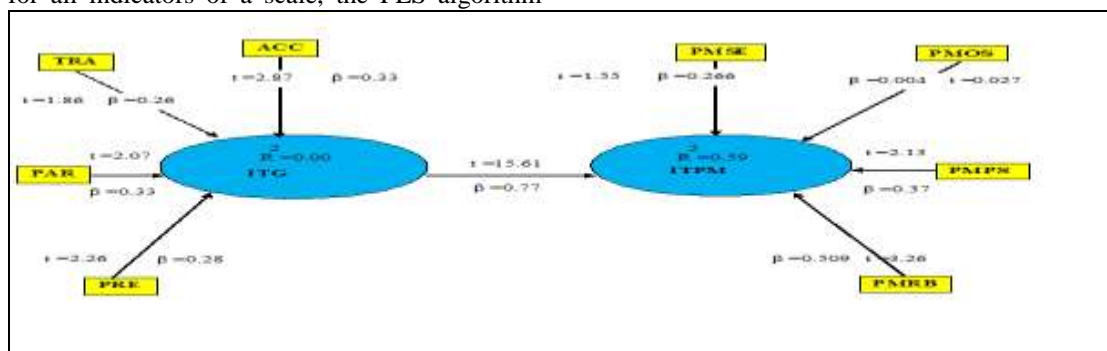


Figure 3: Results of PLS Analysis

### HYPOTHESIS TESTING

A number of techniques used to assess the hypotheses of the model. the first method is the overall coefficient of determination (R square value ) which is An indicator to measure the degree that the model fits the data, if the value of R-square close to 1.0, this indicates that the model accounted for almost all of the variability with the variables determined in the model. And if the R-Squared is 0.0, this means that one term

doesn't assist you to know the other term. The second technique is using standardized estimation coefficients (beta). Standardized regression coefficients (beta coefficients, beta weights) are usually used in quantitative social sciences. They are used for many purposes: selecting variables, determining the relative importance of explanatory variables, comparing the effect of changing different variables, and so forth (Johan, .B , 1994). When the value of beta closes to zero, it means that the relationship is weak, but when the value of beta increased, this means the



relationship is strong. Table 6 shows the results of the evaluation test for the data used in building research model.

### Analysis of Measurement Model 1 (Result Of Itg Construct)

Four hypotheses were presented with respect to this construct. Each one of these hypotheses has a number of independent parameters; namely accountability, transparency, participation and prediction. These parameters were hypothesized to have relationships with dependent variables IT Governance. The associations were tested and the results were interpreted and conclusions are made.

#### IT Governance and Accountability

There is a significant relation between IT Governance and accountability

**H1: ITG and ACC:  $ITG = \beta (ACC) ITG = \beta ACC + \epsilon$**

Accountability was hypothesized to be positively associated with IT Governance. According to the questionnaire results and SmartPLS analysis, beta was found to equal 0.33 which indicates the existence of positive significant relationship between accountability and ITG, and the t-value Accountability to be the most important factor in the IT Governance pillars. The coefficient of determination (R Square) of the accountability was equal to 0.61, which means that 60 % of the total variance in accountability was accounted for the IT Governance, see table 1.

#### IT Governance and transparency

**H2: ITG and ACC:  $ITG = \beta (TRA) ITG = \beta TRA + \epsilon$**

There is a significant relation between IT Governance and transparency of the hypothesized model was significant with a value of 2.87. This indicated that accountability is part of IT Governance which corresponds with the writings of a large number of authors, such as La Porte M. et al., (2000), Asian Development Bank (1998), Mulgan R.(2000) who considered Transparency was hypothesized to be positively associated with IT Governance. According to the questionnaire results and SmartPLS analysis, beta was found to equal 0.26 which indicates the existence of positive significant relationship between accountability and ITG, and the t-value of the hypothesized model was significant with a value of 1.86 at 0.1 significance level. This indicated that transparency is part of IT Governance which

corresponds with the writings of a large number of authors, (Diamond Douglas and Verrecchia., 1991), Rawlins (2006), Johnston (1997), (Benjamin E. Hermalin and Michael S. Weisbach., 2007) who considered transparency to be one of the most important factor in the IT Governance pillars The coefficient of determination (R Square ) of the transparency was equal to 0.53, which means that 53 % of the total variance in accountability was accounted for the IT Governance, see table 2

#### IT Governance and Participation

There is a significant relation between IT Governance and participation

**H3: ITG and PAR:  $ITG = \beta (PAR) ITG = \beta PAR + \epsilon$**

Participation was hypothesized to be positively associated with IT Governance .According to the questionnaire results and SmartPLS analysis, beta was found to equal 0.33 which indicates the existence of positive significant relationship between participation and ITG, and the t-value of the hypothesized model was significant with a value of 2.07. This indicated that participation is part of IT Governance which corresponds with the writings of a large number of authors, such as Richard Heeks (1998), Friedman (2006), Richard Heeks (1998) and Robin Mansell (1998) who considered participation to be one of the most important pillars of the IT Governance. The coefficient of determination (R Square) of the participation was equal to 0.51, which means that 51% of the total variance in the participation was accounted for the IT Governance, see table 3

#### IT Governance and Predictability

There is a significant relation between IT Governance and predictability

**H4: ITG and PRE:  $ITG = \beta (PRE) ITG = \beta PRE + \epsilon$**

Predictability was hypothesized to be positively associated with IT Governance. Based on the survey results and SmartPLS analysis, beta was found to equal 0.28 which indicates the existence of positive significant relationship between predictability and ITG, and the t-value of the hypothesized model was significant with a value of 2.26. This indicated that predictability is part of IT Governance which corresponds with the writings of a large number of authors, Asia group (1998) and OECD (2008) considered predictability to be one of the most important pillars of the IT Governance. A comprehensive examination of the questionnaire statements



discovered that the highest priority had been given to the laws and regulations availability which help in investment prediction in IT field, which is one of the recommendations set by Asia group (1998). The next concern is the Decisions taken depend on laws and regulations, which was recommended by OECD (2008). The third concern is using modern technology helps in prediction process, which was emphasized OECD

(2008). The fourth concern is that the existence of stability in circumstance environment help in success of IT projects, which emphasized by Asia group (1998). The coefficient of determination (R Square) of the participation was equal to 0.64, which means that 64% of the total variance in the participation was accounted for the IT Governance, see table 4

Table 1: Test Statistics and the Result of Hypothesis H1

Regression Path	Test statistics		Results
	Standardized Beta	t-test	
ACC → ITG	0.33	2.87	Accepted

Table 2 Test Statistics and the Result of Hypothesis H 2

Regression Path	Test statistics		Results
	Standardized Beta	t-test	
TRA → ITG	0.26	1.86	Accepted

Table 3: Test Statistics and the Result of Hypothesis H3

Regression Path	Test statistics		Results
	Standardized Beta	t-test	
PAR → ITG	<b>0.33</b>	<b>2.07</b>	Accepted

Table 4: Test Statistics and the Result of Hypothesis H4

Regression Path	Test statistics		Results
	Standardized Beta	t-test	
PRE → ITG	0.28	2.26	Accepted

#### Analysis of Measurement Model 2 (Result of ITPM Construct)

Four hypotheses were presented with respect to this construct. Each one of these hypotheses has a number of independent parameters; namely Technique To Execute Organization Strategy (PMSE), Optimizing Resource Allocation across Projects (PMOS), Projectification of Business Strategy (PMPS), and Risk Balance (PMRB). These parameters were hypothesized to have relationships with dependent variable IT Portfolio Management. The associations were tested and the results were interpreted and conclusions are made.

#### IT Portfolio Management and Execution of Organization Strategy (PMSE)

**H5: ITPM and PMSE:  $ITPM = \beta (PMSE)$**

**$ITPM = \beta PMSE + \varepsilon$**

PMSE was hypothesized to be positively associated with ITPM. According to the questionnaire results and SmartPLS analysis, beta was found to equal 0.27 which indicates the existence of positive significant relationship

between Strategy Execution and ITPM, but the t-value of the hypothesized model was not significant because its value was 1.55. Contrary to commonly accepted practices associated with the importance of ITPM and IT strategy execution as stated by Roberts & Gardiner (1998), Bonham (2004), and (Luftman et al., 2004). In which they said that there is no doubt that ITPM can be a successful instrument for applying strategic plans. In this research the finding is opposite to what they said, the reason might simply be a reflection of the study's design or the specific ITPM mechanisms and IT strategy execution which applied by the sampled organizations, see table 5.

#### IT Portfolio Management and Optimizing Resource Allocation across Projects (PMOS)

**H6: ITPM and PMOS:  $ITPM = \beta (PMOS)$**

**$ITPM = \beta PMOS + \varepsilon$**

PMOS was hypothesized to be positively associated with ITPM. According to the questionnaire results and SmartPLS analysis, beta was found to equal 0.004 which indicates the existence of positive significant relationship



between Optimizing Resource Allocation across Projects and ITPM, but the t- value of the hypothesized model was not significant because its value was 0.027. Contrary to commonly accepted practices associated with the importance of ITPM and Optimizing Resource Allocation across Projects as stated by Kabeh et al.(2005), Goldman (1999) and IT Governance Institute ( 2003), In this research the finding is opposite to what they said, the reason might simply be a reflection of the study's design or the specific IT Portfolio Management and Optimizing Resource Allocation Across Projects which applied by the sampled organizations, see table 6.

#### **IT Portfolio Management and Projectification of Business Strategy (PMPS)**

There is a significant relation between ITPM and Projectification of Business Strategy.

**H7: ITPM and PMPS:  $ITPM = \xi (PMPS)$**   
 $ITPM = \beta PMPS + \varepsilon$

Projectification of Business Strategy was hypothesized to be positively associated with ITPM. According to the questionnaire results and SmartPLS analysis, beta was found to equal 0.37 which indicates the existence of positive significant relationship between Projectification of Business Strategy and ITPM, and the t-value of the hypothesized model was significant with a value of 2.13. This indicated that PMPS is part of ITPM which corresponds with the writings of a large number of authors such as Goldman (1999) and Wikstro (2005). Who considered Projectification of Business Strategy to be one of the most important pillars of the ITPM. A comprehensive examination of the questionnaire statements discovered that the highest priority had been given to "Objectives of IT projects should be aligned with organization's corporate strategy", which is one of the recommendations set by Cooper, & Edgett, (2000) and Goldman (1999). The next concern is there is an existence of integrated IT strategy with the corporate strategy in my organization, which was recommended by Cooper, & Edgett, (2000). The third concern is that "Project requirements are written, clear and referring to the opinion of all responsible people", which was emphasized by IEEE Standard 1233-1998 and Bonham (2004). The fourth concern is that "the Existence of IT project prioritization make a good return for the organization", which emphasized by Datz (2003). The coefficient of determination ( R Square ) of the Projectification Of Business Strategy was equal to 0.64, which means that 64% of the total

variance in the Projectification Of Business Strategy was accounted for the ITPM, see table 7.

#### **IT Portfolio Management and Risks' balance (PMRB)**

There is a significant relation between ITPM and Risks' balance

**H8: ITPM and PMRB:  $ITPM = \xi (PMRB)$**   
 $ITPM = \beta PMRB + \varepsilon$

Risk Balance was hypothesized to be positively associated with ITPM. According to the questionnaire results and SmartPLS analysis results were obtained, beta was found to equal 0.51 which indicates the existence of positive significant relationship between Risk Balance and ITPM, and the t-value of the hypothesized model was significant with a value of 3.26. This indicated that PMRB is part of ITPM which corresponds with the writings of a large number of authors such as Clemons, & Weber ( 1990), Derry, (2007), Charette (1996) and Luftman et al. (2004) who considered Risk Balance to be one of the most important pillars of the ITPM. A comprehensive examination of the questionnaire statements discovered that the highest priority had been given to "organizations make pilot projects before the beginning of real projects ", which is one of the recommendations set Clemons E.K. and Weber.( 1990). The next concern is "organizations take lessons from past problems that happened with projects", which was recommended by (Derry, 2007). The third concern is that "There is an existence of risk analysis and risk monitoring system in my organization ", which was emphasized (Charette, 1996). The fourth concern is that "an existence of qualified experts in organization ", which emphasized by Luftman et al. (2004). The fifth concern is that "Circumstance environment taken into consideration when investing in IT projects. "Which emphasized by Kaplan & Norton (2000). The sixth concern is that "an existence of a plan for technology change management in organization ", which emphasized also by Kaplan & Norton (2000) and Luftman et al (2004). The seventh concern is that "My organization ask for help from third party in dealing with risks when it occur ", which emphasized by Willcocks, & Kern. (2000). the concern number eight is that " an existence of customers knowledge base contains comprehensive details about customers reduce risks that may face IT projects." which emphasized by Luftman et al. (2004). the coefficient of determination (R Square) of the Projectification of Business Strategy was equal to 0.47, which means that 47% of the total variance



in the Risk Balance was accounted for the ITPM, see table 8.

### The Structural Model

With an adequate measurement model and an acceptable level of multicollinearity, the proposed hypotheses were tested with PLS. The results of the analysis are depicted in Figure 3 and summarized in Table 11.

### IT Portfolio Management and its relation with IT Governance

There is a significant relation between ITG and ITPM

**H9: ITG and ITPM:  $ITPM = \beta (ITG)$**

$ITPM = \beta ITG + \varepsilon$

ITPM was hypothesized to be positively associated with ITG. According to the SmartPLS

which analyze path analysis and results were obtained, beta was found to equal 0.77 which indicates the existence of positive significant relationship between ITG as an independent variables and ITPM as a dependent variables, and the t-value of the hypothesized model was significant with a value of 15.61. This indicated that IT Governance enhance IT Portfolio Management which corresponds with the writings of a large number of authors such as Datz, (2003), Cameron (2006), and Bonham (2004). Who considered IT Governance as a good variable for enhancing IT Portfolio Management. The coefficient of determination (R Square) of the ITPM was equal to 0.59, which means that 59% of the total variance in the ITPM was accounted for the IT Governance, see table 9.

Table 5: Test Statistics and the Result of Hypothesis H5

Regression Path	Test statistics		Results
	Standardized Beta	t-test	
ITPM → PMSE	0.27	1.55	Not Accepted

Table 6 Test Statistics and the Result of Hypothesis H6

Regression Path	Test statistics		Results
	Standardized Beta	t-test	
ITPM → PMOS	0.004	0.027	Not Accepted

Table 7: Test Statistics and the Result of Hypothesis H7

Regression Path	Test statistics		Results
	Standardized Beta	t-test	
ITPM → PMPS	0.37	2.13	Accepted

Table 8: Test Statistics and the Result of Hypothesis H8

Regression Path	Test statistics		Results
	Standardized Beta	t-test	
ITPM → PMRB	0.51	3.26	Accepted

Table 9: Test Statistics and the Result of Hypothesis H9

Regression Path	Test statistics		Results
	Standardized Beta	t-test	
ITG → ITPM	0.77	15.61	Accepted

Table 10: Summary of the Path Analysis Results

Regression path	Test statistics	
	Standardized Beta ( $\beta$ )	t- test
<b>Measurement Model</b>		
ACC - ITG	0.33	2.87
TRA - ITG	0.26	1.86
PAR - ITG	0.33	2.26
PRE - ITG	0.28	2.13
<b>Structural Model</b>		
ITG - ITPM	0.77	15.61



### The Research Implications

The findings of the study have explained a number of implications that considered as an important for the Jordanian public sector. Research contributes to encourage Ministry of Public Sector Development and the managers of public sector in Jordan to a more considerate to IT Governance and IT Portfolio Management climate as follows:

Jordan government establishes a good technological infrastructure to apply the concept of e-government. IT Governance one of the important issues that should go with the e-government, so a great consideration should be given to the IT Governance and the importance of its pillars. Accountability should be given a great attention in public sector organization, and it gives a good answerability which means that organization should be ready to answer any question related to official actions. transparency also one of the important issues that should be emphasized and encourage through Jordanian organizations because Transparency is the deliberate attempt to make available all legally releasable information—whether positive or negative in nature—in a manner that is accurate, timely, balanced for the purpose of enhancing the reasoning ability of publics and holding organizations accountable for their actions, policies and practices.” participation should be encouraged in Jordanian public sector organizations Ministry of Information and Communications Technology is responsible for building good infrastructure to guarantee

participation of all parts through advanced technological medias. Predictability is one of the important pillars that should be emphasized in Jordanian public sector organizations in order to encourage the investment in the IT field. All decisions should depend on laws and regulations that adopted in Jordan in order to give the investors the trust and the ability to analyze and predict the future. Enhancing IT Portfolio Management in Jordanian public sector through a good implementation of IT Governance is one of the most important issues that government and manager should concentrate on. There are a lot of projects that should be managed together in order to maximize benefits and minimize risks. Ministry of Public Sector Development is responsible for these issues and should a great attention to this point by cooperating with ministry of Information and Communications Technology in encouraging organizations to apply good IT governance which aligned with the corporate Governance model.

### CONCLUSIONS

Firms should take into considerations the importance of IT governance and its pillars accountability, transparency, participation and predictability in enhancing IT Portfolio Management. Also organizations should take into considerations the pillars of ITPM. We hope that our findings will be useful to others and urge them to support next researches in the IT Governance field, and its role in enhancing the Information Technology Portfolio Management (IRNOP). Calgary: The University of Calgary.

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