RELATIONSHIPS OF TECHNICAL, SEMANTIC, AND ORGANIZATIONAL FACTORS ON ELECTRONIC GOVERNMENT INFORMATION SYSTEMS INTEROPERABILITY IN JORDAN

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ABSTRACT

Information systems (IS) interoperability has been considered from the main characteristic of successful electronic government (e-Government) projects in the past twenty years. As information systems and technologies are being developed and improved, debates on their success have been constantly discussed by researchers and scholars. Achieving interoperability among different organizations is a complex task and affected by various aspects. Previous studies have shown that many e-Government projects in developing countries, like Jordan have encountered various problems after the implementation phase. Hence, the objective of this study is to develop an e-Government IS interoperability model for the public sector in Jordan. This study examined the technical, semantic, organizational, and information technology (IT) capability factors that impact IS interoperability focusing on IS interoperability as the key concept to reach successful implementation of interoperability in Jordanian government. To explore the study constructs and their relationships a variety of published literatures concerning the scope of the study has been critically reviewed. Data were collected using the survey method, and 335 questionnaires were distributed to IT staff in 25 Jordanian ministries. Two hundred and thirty one usable questionnaires were returned. The data were analyzed using the partial least squares-structural equation modeling technique (PLS-SEM). The findings revealed that the technical factors (IT infrastructure, security and privacy), a semantic factor (standardization), organizational factors (business process management, IT human resources, return on investment, and risk management), and IT capability (IT knowledge and IT operations) positively affected IS interoperability. On contrary, there was no moderating effect of the IT capability in the relationship between technical, semantic, and organizational factors and IS interoperability among ministries in Jordan. Technical, semantic, organizational, and IT capability factors are good for promoting e-Government IS interoperability.

Keywords: technical factors, semantic factors, organizational factors, IT capability, e-Government information systems interoperability.

ABSTRAK

Keupayaan saling kendali sistem maklumat (IS) dikatakan berasal daripada ciri-ciri kejayaan projek kerajaan elektronik (e-kerajaan) dua puluh tahun yang lalu. Walaupun sistem maklumat dan teknologi sedang dibangun dan dinaik taraf, perdebatan mengenai kejayaannya sering dibincangkan oleh para penyelidik dan para sarjana. Kebolehan untuk mencapai keupayaan saling kendali dalam organisasi yang berbeza merupakan satu tugas yang kompleks dan dipengaruhi oleh pelbagai aspek. Kajian lepas menunjukkan banyak projek e-kerajaan di negara membangun seperti Jordan menghadapi pelbagai masalah selepas fasa pelaksanaanya. Oleh yang demikian, objektif kajian ini adalah untuk membangunkan model keupayaan saling kendali IS e-kerajaan untuk sektor awam di Jordan. Kajian ini meneliti faktor keupayaan teknikal, semantik, organisasi dan teknologi maklumat (IT) yang memberi kesan kepada keupayaan saling kendali IS dengan menekankan keupayaan saling kendali IS sebagai konsep utama untuk mencapai kejayaan pelaksanaan keupayaan saling kendali dalam kerajaan Jordan. Bagi mengkaji struktur kajian dan hubungannya, pelbagai kajian literatur mengenai skop kajian telah dinilai secara kritikal. Data telah dikumpulkan menggunakan kaedah soal selidik, dan sebanyak 335 borang soal selidik telah diedarkan kepada pekerja IT di 24 buah kementerian di Jordan. Dua ratus tiga puluh satu borang soal selidik yang boleh digunakan telah dikembalikan. Data telah dianalisis menggunakan teknik *Partial Least Squares-Structural Equation Modeling* (PLS-SEM). Hasil kajian menunjukkan faktor-faktor teknikal (infrastruktr IT, keselamatan dan privasi, faktor-faktor semantik (keseragaman), faktor-faktor organisasi (proses pengurusan perniagaan, sumber manusia IT, pulangan pelaburan, dan pengurusan risiko) dan keupayaan IT (pengetahuan IT dan pengendalian IT) berkesan secara positif terhadap keupayaan saling kendali IS. Sebaliknya, tidak terdapat sebarang kesan penyederhanaan keupayaan IT dalam hubungan di antara faktor-faktor teknikal, semantik dan organisasi dan keupayaan saling kendali IS dalam kementerian di Jordan. Faktor-faktor teknikal, semantik organisasi dan keupayaan IT merupakan sesuatu yang baik untuk memperkenalkan keupayaan saling kendali IS e-kerajaan.

Kata kunci: faktor teknikal, faktor semantik, faktor organisasi, keupayaan IT, keupayaan saling kendali sistem maklumat e-kerajaan.

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LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
BPM	Business Process Management
CMB	Common Method Bias
CMMI	Capability Maturity Model Integration
COC	Collaboration and Coordination
CR	Composite Reliability
e-GAF	e-Government Architecture Framework of Jordan
EGDI	e-Government Development Index
e-GIF	Electronic – Government Interoperability Framework
e-GISI	Electronic Government Information Systems Interoperability
e-Government	Electronic Government
EIMM	Enterprise Interoperability Maturity Model
e-Service	Electronic Service
f^2	Effect Size
G2B	Government to Business
G2C	Government to Citizen
G2E	Government to Employee
G2G	Government to Government
GIMM	Government Interoperability Maturity Matrix
HRS	Human Resources
ICT	Information and Communication Technology
IFQ	Information Quality
IS	Information System
ISIMM	Information System Interoperability Maturity Model
ISO	International Organization for Standardization
IT	Information Technology
ITI	Information Technology Infrastructure
ITK	Information Technology Knowledge
ITO	Information Technology Operation
KPIs	Key Performance Indicators
LCIM	Conceptual Interoperability Model
LISI	Levels of Information System Interoperability

MMEI	Maturity Model for Enterprise Interoperability
NEA	National Enterprise Architecture
OF	Organization Factor
OIM	Organizational Interoperability Maturity Model
PLS-SEM	Partial Least Squares path modeling
Q^2	Predictive Relevance
R^2	Coefficient of Determination
RBV	Resource Based View Theory
RDF	Resource Description Framework
RIM	Risk Management
ROI	Return on Investment
SAP	Security and Privacy
SF	Semantic Factor
SGN	Secure Government Network
SOA	Service-Oriented Architecture
SPSS	Statistical Package for the Social Sciences
STD	Standard
STT	Socio-Technical Theory
TF	Technical Factor
TMS	Top Management Support
TOGAF	The Open Group Enterprise Architecture Framework
UML	Unified Manipulation Language
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
US	United States
VIF	Variance Inflation Factor
XML	Extensible Markup Language

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

During the last three decades, the information and communication technology (ICT) revolution has changed human life in various ways, including public sector services (Rokhman, 2011). Electronic government or "e-Government" has been one of the most important developments of this revolution during the last twenty years (Amoretti, 2006). According to Pardo and Tayi (2007), e-Government is the use of modern and advanced technology, such as the Internet and mobile technology to improve and provide better services to citizens and businesses. Based on many researchers and scholars e-Government offers citizens and business improved and fairer access to government services (Alateyah, Crowder, & Wills, 2012; Al-Naimat, Abdullah, Osman, & Ahmad, 2012). Furthermore, according to Rokhman (2011), Pedersen and Tjørnehøj (2017) e-Government offers more flexible, more efficient, more responsive, and more services focused on user satisfaction that can be accessed 24/7 wherever the user is located. In a simpler term, e-Government can be defined as the use of ICT to provide public sector services to citizens and businesses.

The success of e-Government requires that governments change their ways of interacting with citizens, business, and other stakeholders through reducing costs and levels of business process. On the same track, the adoption of e-Government provides many benefits such as responsiveness, transparency, cost reduction, efficiency, productivity, and

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The contents of the thesis is for internal user only

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APPENDIX A QUESTIONNAIRE

Questionnaire Survey

Relationships of Interoperability Domains on e-Government Information Systems Interoperability in Jordan: IT Capability as a Moderator.

Dear participant,

I am a PhD candidate currently conducting research in the area of e-Government. The primary aim of my research is to evaluate e-Government Information Systems Interoperability (e-GISI) within Jordanian ministries. Interoperability among different government ministries is very critical in ensuring an effective service delivery to both individuals and institutions. In this study, interoperability is defined as the ability of different types of (ICT) systems to work together in an effective and efficient way to exchange data and information in a meaningful manner through technical, semantic, and organizational layers. In Arabic, it means " قابلية التشغيل البيني هي قدرة أنظمة تكنولوجيا المعلومات للمؤسسات المختلفة على العمل معا بطريقة فعالة لتبادل البيانات والمعلومات بطريقة مجدية على المستوى التقني،الدلالي والتنظيمي". I hope this study will be yield meaningful results which can provide a significant contribution to the information systems interoperability within public sector. Please be assured that your responses will be kept strictly confidential. The strict ethic guidelines of Universiti Utara Malaysia (UUM) ensure that anonymity is maintained at all times. Hence, no names are required. Individual participants will not be identified in the analysis as only aggregated results will be analyzed and presented. I would very much appreciate your participation and help since the success of this research depends upon your response.

Please attempt to answer every question; there are no right or wrong answers. I am seeking your judgment and opinions only.

This survey is designed for all IT staff in the Jordanian ministries.

Sincerely Yours,
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Instructions:

Do not worry about projecting a good image. The numbers alongside the statements used in this survey stand for the following responses:

1= Strongly disagree,
2= Disagree,
3= Neutral,
4= Agree, and
5= Strongly agree

Many questions in this survey make use of rating scales with 5 places. Please circle on the number that best describes your opinion. For example, if you are asked to rate "The ministry classifies delivering electronic services according to the users' needs" on such a scale, the 5 places should be interpreted as follows:

If you think the ministry classifies delivering electronic services extremely according to users' needs, then you would circle number 5, as follows;

Strongly disagree	Disagree	Neutral	Agree	Strongly agree				
1	2	3	4	5				
The ministry classifies delivering electronic services according to the users' needs.				1	2	3	4	⑤

But,

If you think the ministry classifies delivering electronic services not according users' needs, then you would circle number 1, as follows;

Strongly disagree	Disagree	Neutral	Agree	Strongly agree				
1	2	3	4	5				
The ministry classifies delivering electronic services according to the users' needs.				①	2	3	4	5

In making your ratings, please remember the following points
1. This survey contains four sections, and each section contains number of statements.
2. Please, answer each of the statement related to the question by circling the number that best describes your answer.
3. Some of the questions may appear to be similar, but they do address somewhat different issues; please read each question carefully.
4. Be sure to answer all items – do not omit any.
5. Do not circle more than one number on a single scale.

Section One: Demographic Factors

1. You are working at ministry of ……………………………………..

2. What is your gender?

[ ] Male   [ ] Female

3. Please, check the category that best describe your age,

[ ] Under 30   [ ] 30 – 40

[ ] 41 – 50   [ ] 51 or older

4. Please, check your higher education degree,

[ ] High School   [ ] Diploma   [ ] Bachelor   [ ] Master   [ ] PhD

5. Please, check how many years your experience in the IT field.

[ ] 1 – 5   [ ] 6 – 10

[ ] 11 – 15   [ ] over 15

6. Please, check your position in the ministry.

[ ] Employee   [ ] Head of Division

[ ] Head of Department   [ ] Other; specify

Section Two: Interoperability Domains

The statements below represent the domains of interoperability. Please, indicate the extent to which you agree with each of the statements listed below on the attached scale (Circle one option):

Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5		

	Statement	Level of agreement				
A.1	Top management supports e-Government Information Systems Interoperability (e-GISI) with other ministries. تعزز الإدارة العليا للوزارة التعاون مع الوزارات الأخرى في دعم التشغيل البيني لأنظمة معلومات الحكومة الإلكترونية.	1	2	3	4	5
A.2	Top management has allocated adequate resources to increase e-GISI level. توفر الإدارة العليا للوزارة مصادر كافية لتعزيز مستوى التشغيل البيني لأنظمة معلومات الحكومة الإلكترونية.	1	2	3	4	5
A.3	Top management is aware of the benefits of e-GISI. تدرك الإدارة العليا للوزارة أهمية المنافع للتشغيل البيني لأنظمة معلومات الحكومة الإلكترونية.	1	2	3	4	5
A.4	Top management actively encourages the implementation of IS interoperability initiatives. تشجع الإدارة العليا للوزارة تطبيق المبادرات المقدمة لتعزيز التشغيل البيني لأنظمة معلومات الحكومة الإلكترونية.	1	2	3	4	5
A.5	The top management considers Business Process Reengineering (BPR) as method to improve operational process performance in the ministry. تعتمد الإدارة العليا للوزارة إعادة هندسة الإجراءات كطريقة لتحسين أداء عمليات التشغيل في الوزارة.	1	2	3	4	5
B.1	My ministry's business processes adjusted to new technology requirements, which leads to less direct physical contact, including alignment between back and front office. تتماشى إجراءات العمل المتبعة في الوزارة مع متطلبات التكنولوجيا الحديثة، مما يقلل من التخاطب المباشر بين الموظفين بما في ذلك موظفي تقديم الخدمات المباشرة للجمهور و موظفي الدعم الفني.	1	2	3	4	5
B.2	My ministry's business processes created to align with new technology systems. خطط وإجراءات العمل في الوزارة تتماشى مع أنظمة التكنولوجيا الحديثة.	1	2	3	4	5

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

	Statement	Level of agreement				
B.3	There is a common understanding between an employee in information systems and service units regarding how to use IT to improve business process. يوجد فهم مشترك بين موظفي الأنظمة المعلوماتية ووحدات تقديم الخدمات حول كيفية استخدام تكنولوجيا المعلومات لتحسين اجراءات العمل.	1	2	3	4	5
B.4	My ministry business process is clear to all IT staff. اجراءات عمل الوزارة واضحة لجميع موظفي تكنولوجيا المعلومات.	1	2	3	4	5
B.5	The technical employee in the information systems unit understand the business operations of the ministry services units. موظف وحدة انظمة المعلومات لدية الفهم الكافي لإجراءات العمل في الوحدات الخدمية للوزارة.	1	2	3	4	5
C.1	The human resources are available to implement e-GISI project. الموارد البشرية متوفرة لتنفيذ مشروع التشغيل البيني لأنظمة معلومات الحكومة الإلكترونية.	1	2	3	4	5
C.2	The human resources are available to support e-GISI project. الموارد البشرية متوفرة لاستمرارية عمل مشروع التشغيل البيني لأنظمة معلومات الحكومة الإلكترونية.	1	2	3	4	5
C.3	The technological resources are available to implement e-GISI project. المصادر التقنية متوفرة لتنفيذ مشروع التشغيل البيني لأنظمة معلومات الحكومة الإلكترونية.	1	2	3	4	5
C.4	The human resources are available to enhance the level of e-GISI. الموارد البشرية متوفرة لتحسين مستوى التشغيل البيني لأنظمة معلومات الحكومة الإلكترونية.	1	2	3	4	5
D.1	I attend regular meetings with IT staff from other ministries, frequently. احضر اجتماعات مشتركة مع موظفي تكنولوجيا المعلومات من الوزارات الأخرى بشكل دائم.	1	2	3	4	5
D.2	I participate in formulating the agreements related to information systems with IT staff from other ministries. أشارك في وضع صيغ الاتفاقيات المتعلقة بأنظمة المعلومات مع موظفي تكنولوجيا المعلومات من الوزارات الأخرى.	1	2	3	4	5

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Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

	Statement	Level of agreement				
D.3	I participate in working with IT staff from other ministries for shared IT projects. أعمل مع موظفي تكنولوجيا المعلومات من الوزارات الأخرى في المشاريع المشتركة.	1	2	3	4	5
E.1	Implementation of e-GISI can reduce costs of government operations. تطبيق التشغيل البيني لأنظمة معلومات الحكومة الإلكترونية يقلل من تكاليف العمليات الحكومية.	1	2	3	4	5
E.2	Implementation of e-GISI can enhance revenue collection. تطبيق التشغيل البيني لأنظمة معلومات الحكومة الإلكترونية يعمل على تحسين الإيرادات التي يتم تحصيلها.	1	2	3	4	5
F.1	My ministry has a visible risk management committee. وجود لجنة مختصة لإدارة المخاطر في الوزارة التي أعمل بها.	1	2	3	4	5
F.2	My ministry has an information system (IS) to register, monitor and report risks. وجود نظام خاص بتسجيل و متابعة و التبليغ عن المخاطر في الوزارة.	1	2	3	4	5
F.3	My ministry repeats the process of risk assessment once a year. تقوم الوزارة بإعادة تقييم المخاطر بشكل سنوي.	1	2	3	4	5
F.4	My ministry has an active Disaster Recovery (DR) site. لدى الوزارة موقع الكتروني احتياطي مفعل للتعافي من الكوارث.	1	2	3	4	5
G.1	The IS in my ministry has a sufficient content. النظام المعلوماتي للوزارة يحتوي على معلومات وافية.	1	2	3	4	5
G.2	The IS in my ministry provides complete information. يوفر النظام المعلوماتي في الوزارة المعلومات بشكل كامل.	1	2	3	4	5
G.3	The IS in my ministry provides accurate information. يوفر النظام المعلوماتي في الوزارة معلومات دقيقة.	1	2	3	4	5
G.4	The IS in my ministry provides timely information. يوفر النظام المعلوماتي في الوزارة معلومات بالوقت المطلوب.	1	2	3	4	5
G.5	The IS in my ministry provides reliable information. يوفر النظام المعلوماتي في الوزارة معلومات موثوقة يمكن الاعتماد عليها.	1	2	3	4	5
G.6	The IS in my ministry browses the information in an appropriate format. يعرض النظام المعلوماتي في الوزارة المعلومات بشكل لائق للمستخدم.	1	2	3	4	5

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

	Statement	Level of agreement				
H.1	The ISs in my ministry use standards for alignment with other data models such as UML, XML. يقوم النظام المعلوماتي بالوزارة باستخدام معايير قياسية متوافقة مع الأنظمة المعلوماتية الأخرى مثل UML و XML.	1	2	3	4	5
H.2	The ISs in my ministry accessed based on standard protocols (i.e. data is available on server and accessed via intranet protocols). الأنظمة المعلوماتية في الوزارة متماشية مع البروتوكولات المعيارية (مثل: البيانات متوفرة على الخادم و يمكن الوصول إليها عبر بروتوكولات نظام الاتصال الداخلي)	1	2	3	4	5
H.3	The ISs in my ministry use unified categories guidelines that are common with other government ministries. تستخدم أنظمة المعلومات في الوزارة أدلة تصانيف موحدة متوافقة مع الوزارات الأخرى.	1	2	3	4	5
I.1	My ministry aligns IT infrastructure and e-Government strategy. تتماشى البنية التحتية لتكنولوجيا المعلومات مع استراتيجية الحكومة الإلكترونية.	1	2	3	4	5
I.2	My ministry builds an effective IT infrastructure. البنية التحتية لتكنولوجيا المعلومات في الوزارة فعالة.	1	2	3	4	5
I.3	My ministry has sufficient budget for a purchase of an updated hardware and software for operational processes. وجود ميزانية كافية لدى الوزارة لشراء و تطوير الأجهزة و الأنظمة المستخدمة في أعمال الوزارة.	1	2	3	4	5
I.4	My ministry connects to internet through SGN. الوزارة متصلة بالأنترنت عبر الشبكة الحكومية الامنة.	1	2	3	4	5
I.5	My ministry makes PC's or laptops available for the staff. توفر الوزارة أجهزه الحاسوب الشخصية أو المحمولة للموظفين.	1	2	3	4	5
J.1	My ministry has multi security layers to secure their information system. توفر الوزارة أنظمة حماية متعددة المستويات لحماية أنظمة المعلومات لديها.	1	2	3	4	5
J.2	My ministry has powerful anti-virus software. لدى الوزارة نظام مضاد للفيروسات فعال.	1	2	3	4	5
J.3	My ministry applies the information security policy. تطبق الوزارة سياسة أمن وحماية المعلومة.	1	2	3	4	5
J.4	My ministry provides safe transactions through its website. تضمن الوزارة الاستخدام الامن للتعاملات التي تتم من خلال الموقع الإلكتروني.	1	2	3	4	5

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Section Three: IT Capability

The statements below represent the IT Capability. Please, indicate the extent to which you agree with each of the statements listed below on the attached scale:

Strongly disagree	Disagree	Neutral	Agree		Strongly agree	
1	2	3	4		5	

	Statement		Level of agreement			
K.1	My ministry operations staff are knowledgeable about IT operations. الفريق التنفيذي في الوزارة مطلع على العمليات التي يقوم بها موظفو تكنولوجيا المعلومات.	1	2	3	4	5
K.2	The tasks I perform at my job related to my job specialization. المهام الوظيفية التي أقوم بها متعلقة باختصاصي.	1	2	3	4	5
K.3	The IT staff exchange and share their experiences and knowledge with each other. يتبادل موظفو تكنولوجيا المعلومات خبراتهم الوظيفية والمعرفية.	1	2	3	4	5
K.4	I have a knowledge about the e-GISI initiatives and projects from the initial stages. لدي معرفة وافية لمبادرات التشغيل البيني لأنظمة معلومات الحكومة الإلكترونية من المراحل الأولى.	1	2	3	4	5
K.5	I have the knowledge to develop and maintain computer-based communication links with other ministries. لدي المعرفة التي تؤهلني لإنشاء و استمرار عملية التواصل الإلكتروني مع الوزارات الأخرى.	1	2	3	4	5
L.1	My ministry daily operations are linked to branches through LAN/WAN. تتصل الوزارة مع المديريات التابعة لها عبر شبكة اتصالات داخلية او خارجية بشكل يومي.	1	2	3	4	5
L.2	My ministry computer-link system down time is minimal. يتعطل نظام الاتصال الحاسوبي في الوزارة بشكل محدود جدا.	1	2	3	4	5
L.3	My ministry has computerized all its operational service. تم حوسبة جميع الخدمات التي تقدمها الوزارة.	1	2	3	4	5
L.4	My ministry IT policy is in line with regulatory guidelines. تتماشى سياسة تكنولوجيا المعلومات مع المبادئ التوجيهية التنظيمية للوزارة.	1	2	3	4	5
L.5	My ministry IT operations monitor citizen activities. يتم رصد المعاملات الإلكترونية التي يقوم بها متلقي الخدمة.	1	2	3	4	5

Section Four: e-Government IS interoperability (e-GISI) level

The statements below represent the e-Government IS interoperability. Please, indicate the extent to which you agree with each of the statements listed below on the attached scale (Circle one option):

Strongly disagree	Disagree	Neutral	Agree	Strongly agree	
1	2	3	4	5	
Statement			**Level of agreement**		

	Statement					
M.1	There are national legislative adjustments in order to provide government e-Services. هناك تشريعات وطنية معدلة لتقديم الخدمات الإلكترونية.	1	2	3	4	5
M.2	My ministry offers online access to its e-service and databases for multiple government agencies. تقدم الوزارة خدمات إلكترونية مفتوحة للعديد من المؤسسات الحكومية.	1	2	3	4	5
M.3	My ministry uses metadata standards (e.g. XML, RDF, and e-GMS) to describe its documents that comply with the national government interoperability standards and are exchangeable with other government ministries and units. تستخدم الوزارة البيانات الوصفية (مثل XML و RDF و e-GMS) لتقديم ملفاتها التي تتماشى مع مستوى التشغيل البيني للحكومة ويتم تبادلها مع المؤسسات الحكومية الأخرى.	1	2	3	4	5
M.4	My ministry uses common code lists (e.g. ISIC, ISCO, and ISCED), which defined from national or international organizations in order to use it and implement predefined lists in its documents. تستخدم الوزارة أدلة التصانيف الموحدة (مثل ISIC و ISCO و ISCED) و التي يتم استحداثها من المؤسسات الوطنية والدولية ليتم استخدامها في انظمة المعلومات.	1	2	3	4	5
M.5	My ministry classifies delivering electronic services according to the users' needs. تعمل الوزارة على تصنيف الخدمات الإلكترونية حسب احتياجات المستخدمين.	1	2	3	4	5
M.6	My ministry back-office systems can communicate and interchange data with other systems, usually electronic services delivery. فريق الدعم الفني في الوزارة قادر على التفاعل و التعامل مع البيانات في الأنظمة الأخرى والمرتبطة بتقديم خدمات إلكترونية.	1	2	3	4	5
M.7	My ministry uses web services with its information systems to interact with other government agencies through (ESB,GSB). تتواصل الوزارة مع غيرها من المؤسسات الحكومية عبر خدمة الويب من خلال مشروع الربط الشامل.	1	2	3	4	5

Strongly disagree	Disagree	Neutral	Agree	Strongly agree		
1	2	3	4	5		
Statement				Level of agreement		
M.8	My ministry's portal provides a single-sign-on facility for authentication process to transfer user's credentials between distributed systems. لدى الوزارة بوابة الكترونية توفر خدمة الدخول الموحد للعديد من أنظمة معلوماتها.	1	2	3	4	5
M.9	My ministry has effective e-Government's unit responsible for e-Transformation of the services. لدى الوزارة وحدة حكومة الكترونية فعالة مسؤولة عن التحول الالكتروني للخدمات.	1	2	3	4	5
M.10	My ministry has a visible e-GAF Framework for Interoperability (GEFI) that is clear to IT staff. لدى الوزارة اطار عمل محدد للتشغيل البيني واضح لموظفي تكنولوجيا المعلومات.	1	2	3	4	5

e-GISI: e-Government Information Systems Interoperability
XML: Extensible Markup Language
RDF: Resource Description Framework (Standard model for data interchange on the web)
e-GMS: e-Government Metadata Standard
ISIC: International Standard Industrial Classification of All Economic Activities
ISCO: International Standard Classification of Occupations
ISCED: International Standard Classification of Education
ESB: Enterprise Service Bus
GSB: Government Service Bus
e-GAF: e-Government Architecture Framework
GEFI: e-GAF Framework for Interoperability

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APPENDIX B

e-Government Development Index in the Western Asia Region

Country	e-Government development Index (EGDI)						World e-Gov. Development Rank					
	2016	2014	2012	2010	2008	2005	2016	2014	2012	2010	2008	2005
Israel	0.7806	0.8162	0.8100	0.6552	0.7393	0.6903	20	17	16	26	17	24
Bahrain	0.7734	0.8089	0.6946	0.7363	0.5723	0.5282	24	18	36	13	42	53
Emirates	0.7515	0.7136	0.7344	0.5349	0.6301	0.5718	29	32	28	49	32	42
Kuwait	0.7080	0.6268	0.5960	0.5290	0.5202	0.4431	40	49	63	50	57	75
Saudi Arabia	0.6822	0.6900	0.6658	0.5142	0.4935	0.4105	44	36	41	58	70	80
Qatar	0.6699	0.6362	0.6405	0.4928	0.5314	0.4895	48	44	48	62	53	62
Azerbaijan	0.6274	0.5472	0.4984	0.4571	0.4609	0.3773	56	68	96	83	89	101
Georgia	0.6108	0.6047	0.5563	0.4248	0.4598	0.4034	61	56	72	100	90	83
Cyprus	0.6023	0.5958	0.6508	0.5705	0.6019	0.5872	64	58	45	42	35	37
Oman	0.5962	0.6273	0.5944	0.4576	0.4691	0.3405	66	48	64	82	84	112
Turkey	0.5900	0.5443	0.5281	0.4780	0.4834	0.4960	68	71	80	69	76	60
Lebanon	0.5646	0.4982	0.5139	0.4388	0.4840	0.4560	73	89	87	93	74	71
Armenia	0.5179	0.5897	0.4997	0.4025	0.4182	0.3625	87	61	94	110	103	106
Jordan	0.5123	0.5167	0.4884	0.5278	0.5480	0.4639	91	79	98	51	50	68
Syria	0.3404	0.3134	0.3705	0.3103	0.3614	0.2871	137	135	128	133	119	132
Iraq	0.3334	0.3141	0.3409	0.2996	0.2690	0.3334	141	134	137	136	151	118
Yemen	0.2248	0.2720	0.2472	0.2154	0.2142	0.2125	174	150	167	164	164	154

*Source.* United Nations, (2005; 2008; 2010; 2012; 2014; 2016)

APPENDIX C

Distribution of ICT employees in Jordan ministries

Ministry	Percent from target population	Population of ICT employees	Systematic random sampling
Ministry of Agriculture (MOA)	3.53%	15	12
Ministry of Awqaf Islamic Affairs and Holy Places (AWQAF)	1.41%	6	5
Ministry of Culture (CULTURE)	0.94%	4	3
Ministry of Education (MOE)	10.59%	45	36
Ministry of Energy and Mineral Resources (MEMR)	3.29%	4	11
Ministry of Environment (MOENV)	1.41%	6	5
Ministry of Finance (MOF)	11.06%	47	37
Ministry of Foreign Affairs (MFA)	1.88%	8	6
Ministry of Health (MOH)	5.41%	23	18
Ministry of Higher Education and Scientific Research (MOHE)	2.35%	10	8
Ministry of Industry and Trade (MIT)	5.88%	25	20
Ministry of Information and Communications Technology (MOICT)	7.53%	32	25
Ministry of Interior (MOI)	4.71%	20	16
Ministry of Justice (MOJ)	5.88%	25	20
Ministry of Labor (MOL)	6.12%	26	20
Ministry of Municipal Affairs (MMA)	3.53%	15	12
Ministry of Planning and International Cooperation (MOP)	2.82%	12	9
Ministry of Political and Parliamentary Affairs (MOPPA)	0.24%	1	1
Ministry of Public Sector Development (MOPSD)	0.71%	3	2
Ministry of Public Works and Housing (MPWH)	6.35%	27	21
Ministry of Social Development (MOSD)	2.82%	12	9
Ministry of Tourism and Antiquities (MOTA)	1.41%	6	5
Ministry of Transport (MOT)	1.65%	7	6
Ministry of Water and Irrigation (MWI)	7.53%	32	25
Ministry of Youth (Youth)	0.94%	4	3
Total	**100%**	**425**	**335**

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APPENDIX D: MEASUREMENT MODEL

Appendix D1: Cronbach's Alpha

Cronbach's Alpha
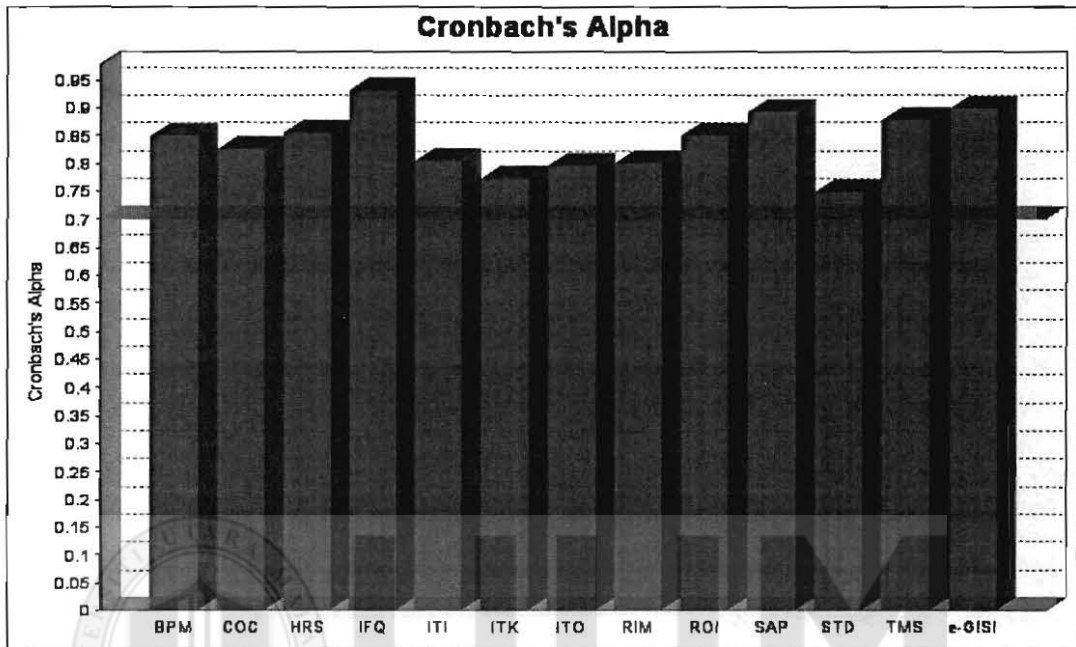
Appendix D2: Composite Reliability

Composite Reliability
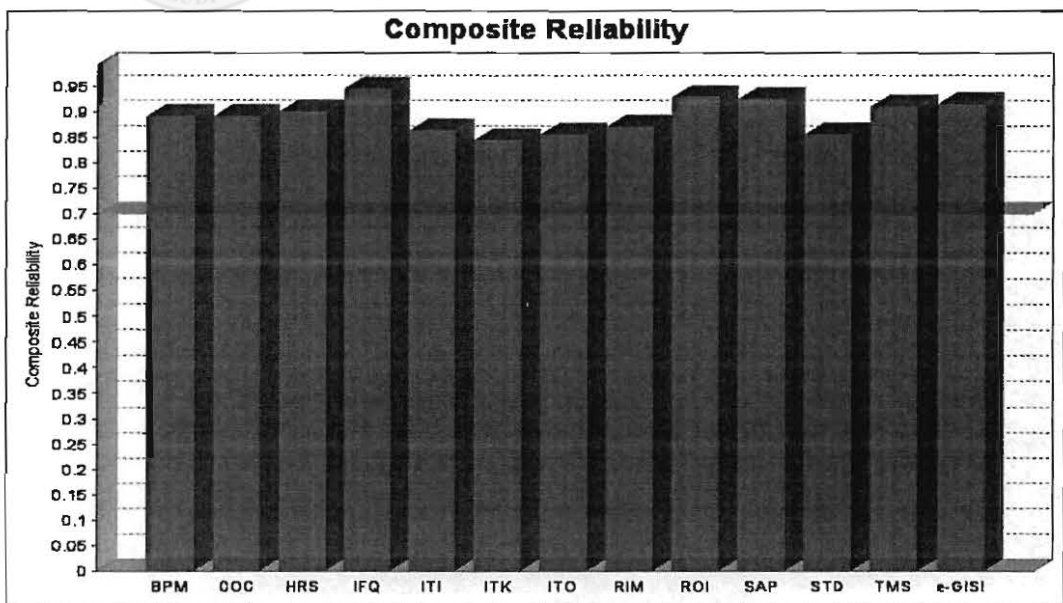
Appendix D3: Average Variance Extracted

Average Variance Extracted (AVE)
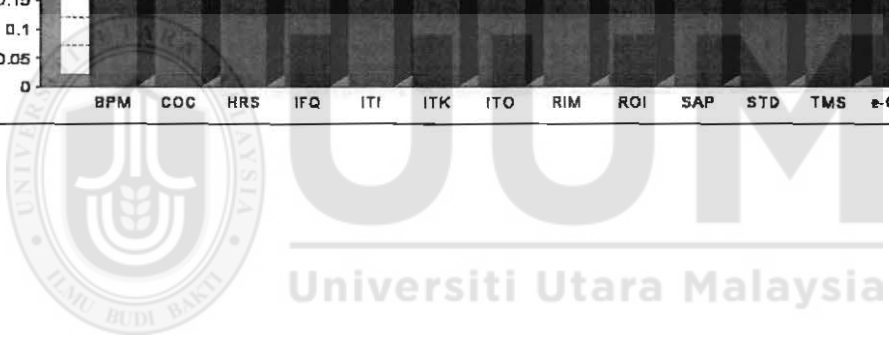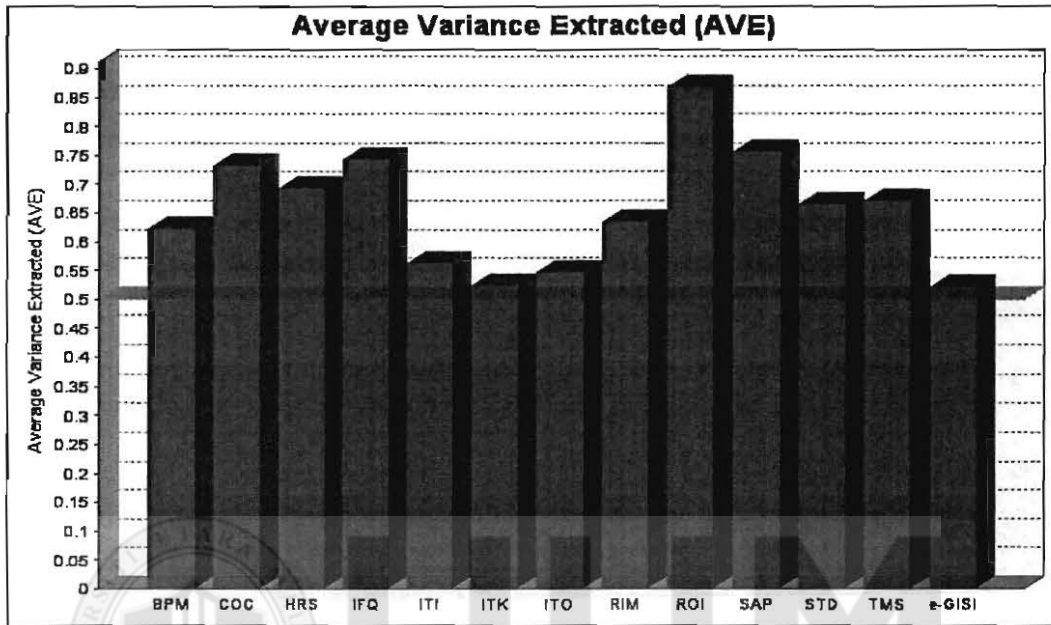
APPENDIX E: STRCTURAL MODEL

Appendix E1: Path Coefficient Direct

Appendix E2: Path Coefficient Direct and Indirect

Appendix E3: Coefficient of Determination (R^2)

R Square
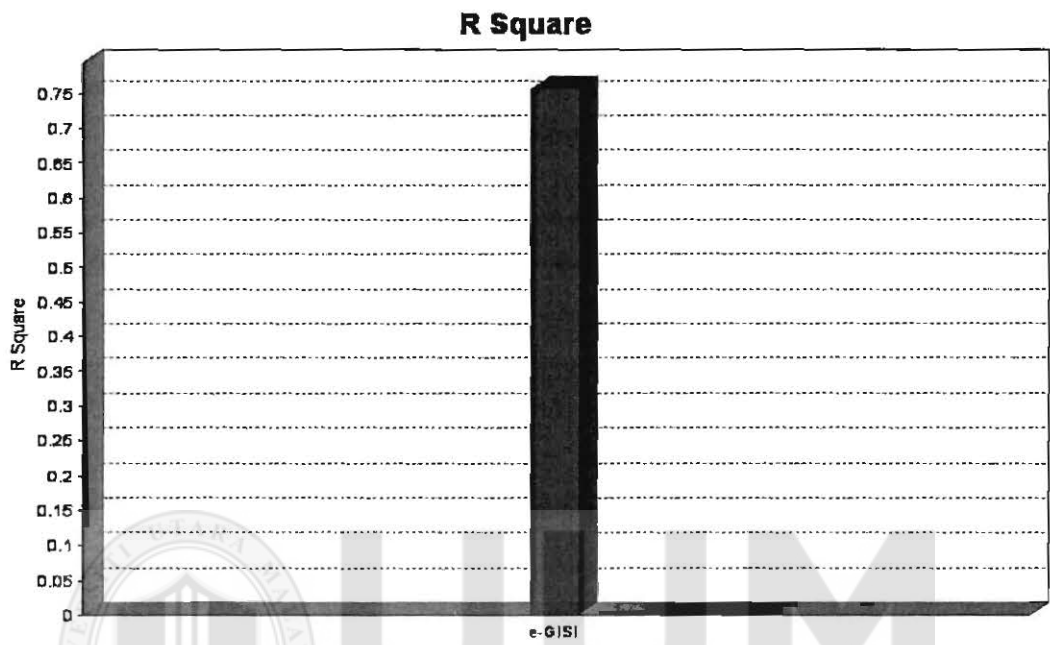
Appendix E4: Effect Size (f^2)

f Square
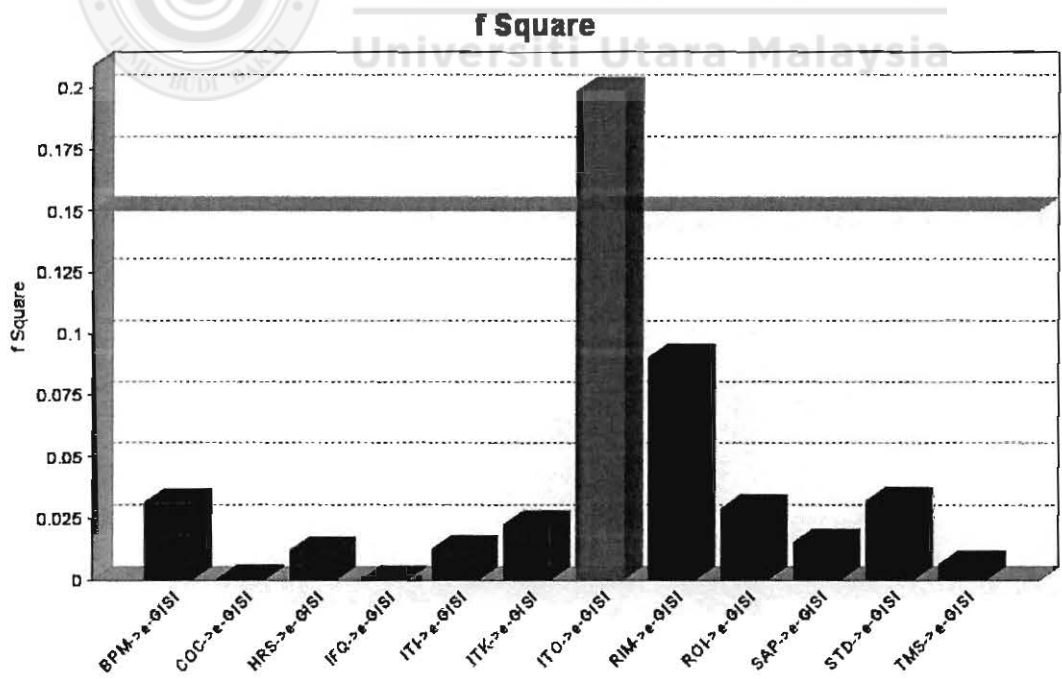
APPENDIX F

Organizational Structure of Public Entities in Jordan
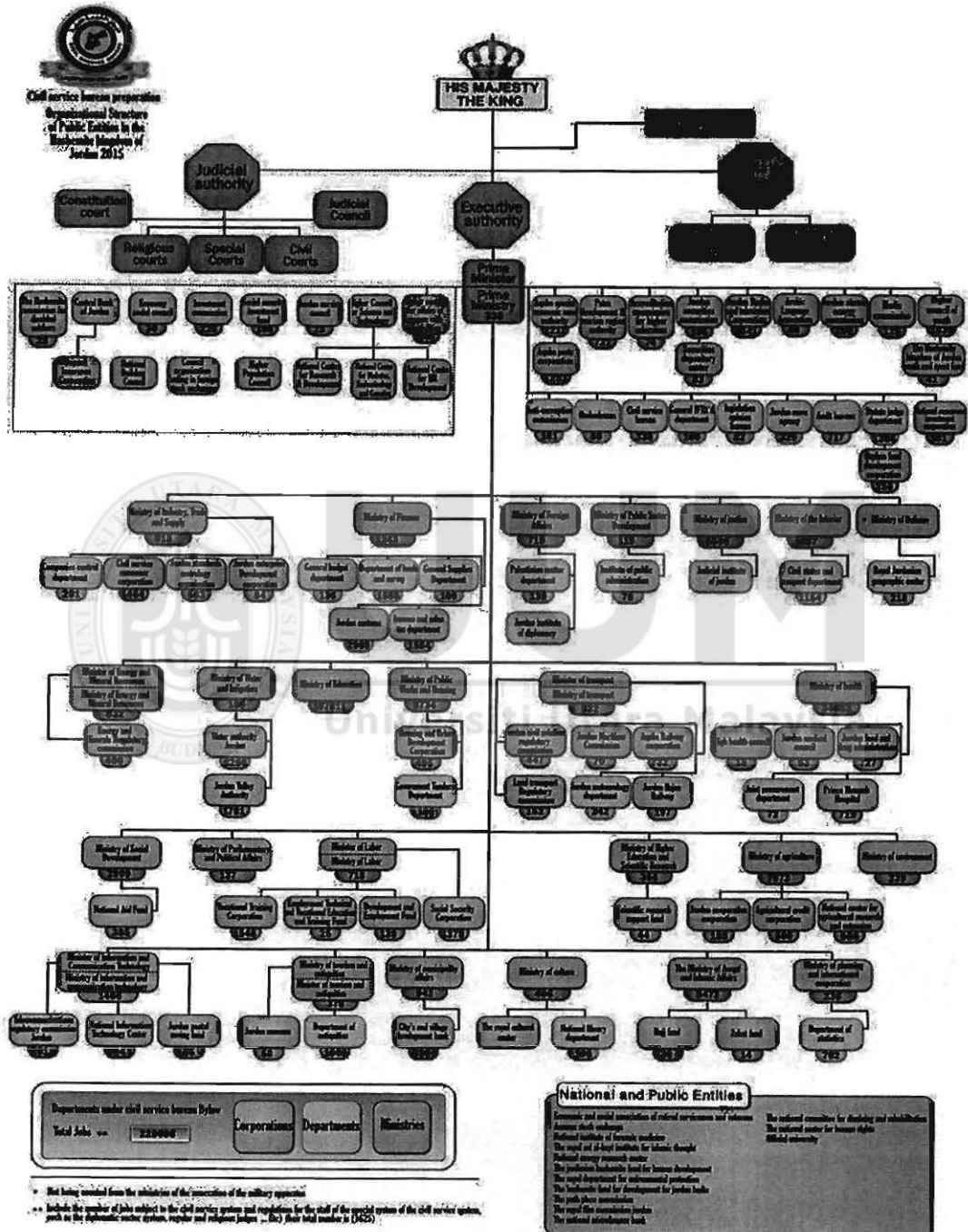
Appendix G: Example of Random Sample Selection for Ministry of Agriculture
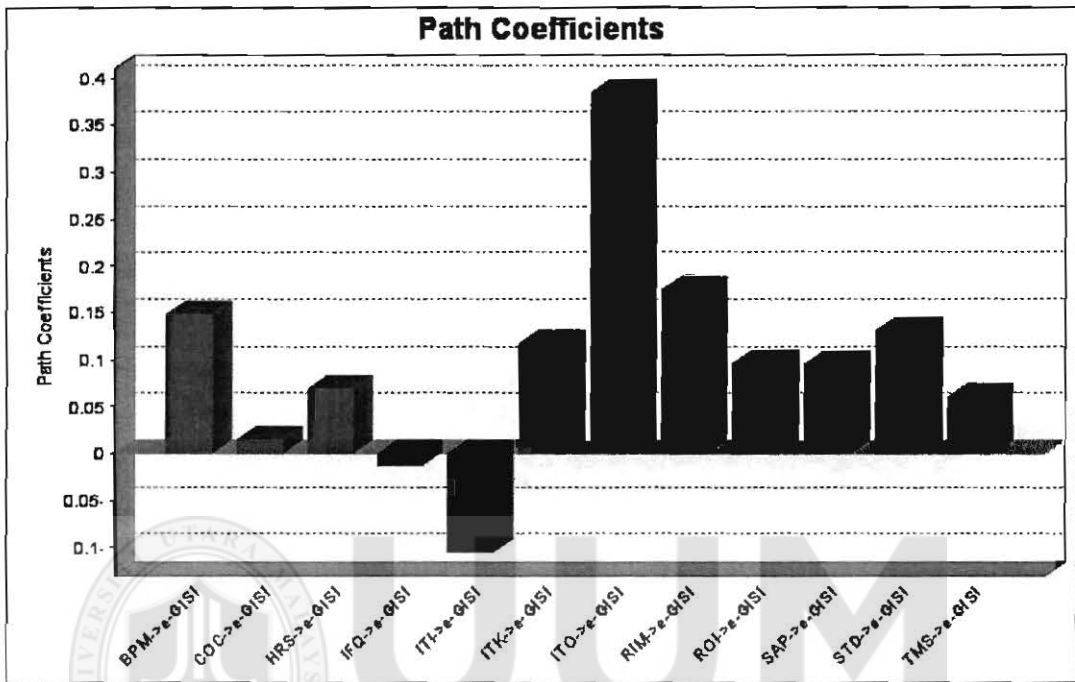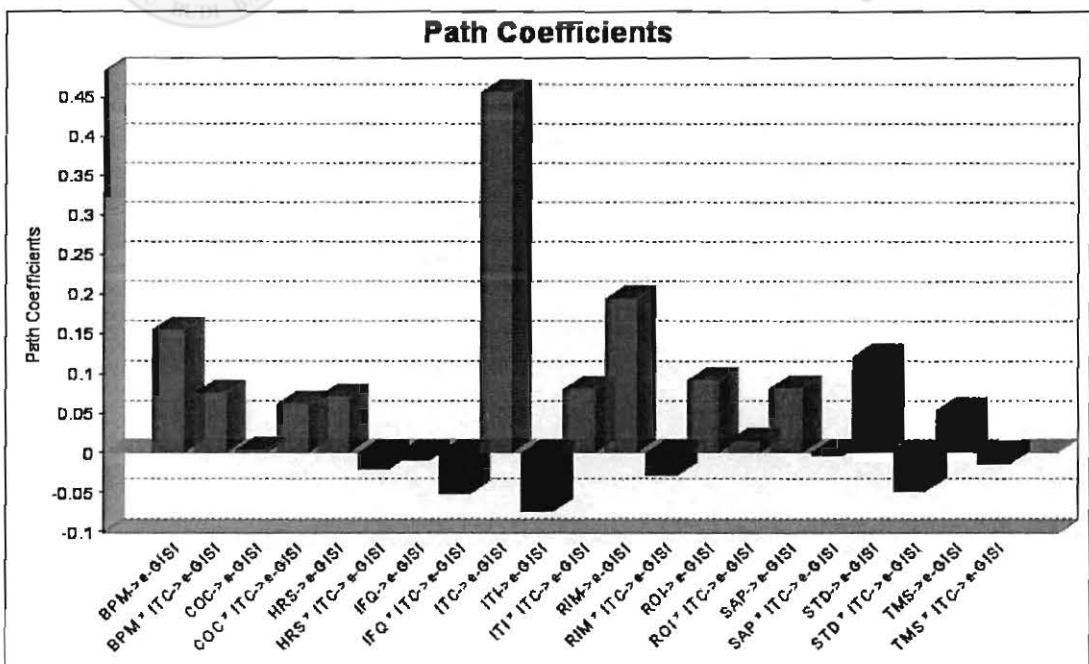
Ministry of Agriculture (MOA)		
Ser.	Emp.#	Random
1	Emp.#3	0.969268
2	Emp.#5	0.964393
3	Emp.#11	0.792232
4	Emp.#7	0.760275
5	Emp.#8	0.682582
6	Emp.#12	0.644282
7	Emp.#1	0.602355
8	Emp.#9	0.526135
9	Emp.#14	0.467238
10	Emp.#6	0.305332
11	Emp.#10	0.296018
12	Emp.#2	0.279201
13	Emp.#4	0.255711
14	Emp.#15	0.199541
15	Emp.#13	0.111463

Appendix H: Heterotrait-Monotrait (HTMT) Ratio Statistical test

	HTMT	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
COC -> BPM	0.360	0.069	5.207	0.000
HRS -> BPM	0.553	0.063	8.816	0.000
HRS -> COC	0.205	0.073	2.795	0.005
IFQ -> BPM	0.721	0.043	16.623	0.000
IFQ -> COC	0.311	0.075	4.129	0.000
IFQ -> HRS	0.526	0.058	9.018	0.000
ITI -> BPM	0.819	0.040	20.684	0.000
ITI -> COC	0.327	0.067	4.895	0.000
ITI -> HRS	0.531	0.055	9.575	0.000
ITI -> IFQ	0.721	0.039	18.575	0.000
ITK -> BPM	0.717	0.053	13.549	0.000
ITK -> COC	0.464	0.075	6.190	0.000
ITK -> HRS	0.483	0.063	7.609	0.000
ITK -> IFQ	0.675	0.058	11.698	0.000
ITK -> ITI	0.830	0.047	17.561	0.000
ITO -> BPM	0.748	0.049	15.308	0.000
ITO -> COC	0.361	0.076	4.729	0.000
ITO -> HRS	0.433	0.067	6.513	0.000
ITO -> IFQ	0.734	0.043	16.945	0.000
ITO -> ITI	0.889	0.038	23.439	0.000
ITO -> ITK	0.887	0.038	23.322	0.000
RIM -> BPM	0.354	0.074	4.762	0.000
RIM -> COC	0.429	0.080	5.377	0.000
RIM -> HRS	0.398	0.071	5.635	0.000
RIM -> IFQ	0.418	0.072	5.837	0.000
RIM -> ITI	0.392	0.061	6.434	0.000
RIM -> ITK	0.428	0.079	5.418	0.000
RIM -> ITO	0.468	0.057	8.217	0.000
ROI -> BPM	0.435	0.071	6.077	0.000
ROI -> COC	0.196	0.062	3.168	0.002
ROI -> HRS	0.218	0.068	3.189	0.001
ROI -> IFQ	0.362	0.078	4.656	0.000
ROI -> ITI	0.398	0.072	5.547	0.000
ROI -> ITK	0.439	0.076	5.800	0.000
ROI -> ITO	0.448	0.073	6.125	0.000
ROI -> RIM	0.053	0.040	1.340	0.180
SAP -> BPM	0.641	0.048	13.449	0.000
SAP -> COC	0.234	0.064	3.664	0.000
SAP -> HRS	0.406	0.062	6.587	0.000
SAP -> IFQ	0.584	0.051	11.553	0.000

SAP -> ITI	0.860	0.034	25.227	0.000
SAP -> ITK	0.737	0.045	16.530	0.000
SAP -> ITO	0.799	0.042	18.830	0.000
SAP -> RIM	0.343	0.071	4.825	0.000
SAP -> ROI	0.357	0.075	4.769	0.000
STD -> BPM	0.645	0.060	10.730	0.000
STD -> COC	0.422	0.071	5.931	0.000
STD -> HRS	0.573	0.067	8.565	0.000
STD -> IFQ	0.700	0.050	14.054	0.000
STD -> ITI	0.797	0.052	15.457	0.000
STD -> ITK	0.729	0.056	12.961	0.000
STD -> ITO	0.765	0.047	16.223	0.000
STD -> RIM	0.500	0.084	5.978	0.000
STD -> ROI	0.460	0.071	6.473	0.000
STD -> SAP	0.653	0.056	11.715	0.000
TMS -> BPM	0.805	0.035	22.931	0.000
TMS -> COC	0.359	0.068	5.303	0.000
TMS -> HRS	0.545	0.061	8.868	0.000
TMS -> IFQ	0.558	0.052	10.717	0.000
TMS -> ITI	0.751	0.046	16.461	0.000
TMS -> ITK	0.600	0.058	10.390	0.000
TMS -> ITO	0.628	0.054	11.589	0.000
TMS -> RIM	0.322	0.063	5.098	0.000
TMS -> ROI	0.385	0.068	5.688	0.000
TMS -> SAP	0.613	0.049	12.525	0.000
TMS -> STD	0.585	0.060	9.716	0.000
e-GISI -> BPM	0.761	0.042	18.070	0.000
e-GISI -> COC	0.407	0.072	5.681	0.000
e-GISI -> HRS	0.536	0.059	9.108	0.000
e-GISI -> IFQ	0.680	0.049	13.960	0.000
e-GISI -> ITI	0.750	0.045	16.583	0.000
e-GISI -> ITK	0.811	0.043	18.751	0.000
e-GISI -> ITO	0.894	0.028	32.399	0.000
e-GISI -> RIM	0.581	0.059	9.823	0.000
e-GISI -> ROI	0.470	0.063	7.418	0.000
e-GISI -> SAP	0.711	0.044	16.098	0.000
e-GISI -> STD	0.792	0.053	15.003	0.000
e-GISI -> TMS	0.659	0.046	14.392	0.000

Scale: All Variables

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.961	.963	61

Scale: Each Variable

Reliability Statistics

Constructs	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
TMS	.895	.894	5
BPM	.861	.863	5
COC	.846	.848	4
HRS	.856	.856	3
ROI	.952	.952	2
RIM	.820	.833	4
IFQ	.916	.918	6
STD	.735	.736	3
ITI	.791	.807	5
SAP	.931	.933	4
ITK	.659	.666	5
ITO	.741	.748	5
e-GISI	.876	.875	10