2016

Effects of Information Technology Risk Management and Institution Size on Financial Performance

Shaun D'olene Kecia Barrett
Walden University

Walden University

College of Management and Technology

This is to certify that the doctoral study by

Shaun Barrett

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Scott Burrus, Committee Chairperson, Doctor of Business Administration Faculty

Dr. Cheryl McMahan, Committee Member, Doctor of Business Administration Faculty

Dr. Yvette Ghormley, University Reviewer, Doctor of Business Administration Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2016

Abstract

Effects of Information Technology Risk Management and Institution Size on Financial Performance

by

Shaun Barrett

MBA, Mona School of Business, University of the West Indies, Mona, 2004

BSc, University of the West Indies, Mona, 1997

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

July 2016

Abstract

A negative relationship exists between unmanaged IT risk and financial performance of institutions of varying sizes. The purpose for this quantitative correlation study was to examine the relationship between IT risk management, institution size, and the financial performance of credit unions in Jamaica. Information Systems Audit and Control Association (ISACA) risk IT model provided the theoretical framework for the study. Audited financial statements and a web-based survey provided data for this study. One hundred and thirty employees from 13 credit unions in Jamaica participated in the study. Results of the multiple regression tests confirmed a statistically significant relationship between IT risk management, institution size, and the financial performance of Jamaican credit unions, F (2, 99) = 46.861, p = 0.000, R^2 = .486. Institution size was a statistically significant predictor of financial performance (beta = -.637, p = .000). IT risk management initiatives did not provide any significant variation (beta = .139, p = .074) in financial performance. Research findings may lead to more effective and efficient operations of Jamaican credit unions and improvement in their financial performance, which could result in positive social change through the increases in corporate social contributions, the payment of dividends, and the offer of affordable product and services for over 1 million Jamaican credit union members.

Effects of Information Technology Risk Management and Institution Size on Financial Performance

by

Shaun Barrett

MBA, Mona School of Business, University of the West Indies, Mona, 2004

BSc, University of the West Indies, Mona, 1997

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Business Administration

Walden University

July 2016

Dedication

I dedicate this paper to my son and my daughter. To my son, who slept in my lap for many nights as I worked on my research, thank you. To my daughter, who journeyed with me from fetus to a bright young girl, I dedicate this paper to you. I was not always able to play or dance with you both (my son and my daughter) as much as you wanted, but though you are young, you understood that I had to complete my paper. To my father who provided not only morale support but financial assistance, I thank you. To my husband, other family members, and friends who gave encouraging remarks and support, I thank you. Most of all, I dedicate this paper to my Heavenly Father, Jesus Christ, and Holy Spirit – three in one, thank you for your grace, mercy, love, and blessings.

Acknowledgments

To my first mentor, Dr. Bruce Lazar, I would like to acknowledge your patience and contribution to my paper. To my committee chair, Dr. Burrus Scott, thank you for your guidance, patience, and support as I completed this paper. I would like to acknowledge Dr. Cheryl McMahan. Your guidance and eyes for details were impeccable, and I am grateful for your contribution to this paper. I would also like to acknowledge my URR Dr. Ghormley, thank you for your dedication to high standards and quality.

Table of Contents

List of Tables

List of Figures

Section 1: Foundation of the Study

Institutions face increased business risks from data leakage, asset theft, and reputational damage because of the proliferation of mobile computing, social networking, and cloud-based technology (Carcary, 2013). According to Teilans et al. (2011), unmanaged technology risks may negatively affect the financial performance of institutions. The aim of this study was to examine the relationship between IT risk management measured using web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's return on asset (ROA) using data from credit unions in Jamaica, West Indies. The results from this study could provide institution leaders with additional information on the relationship between the research variables. This additional information may assist management in making appropriate strategic decisions regarding the financial performance of the institutions.

Background of the Problem

The reliance on information technology (IT) is increasing in the dynamic business environment as leaders use IT to strengthen their business strategies (Morales, 2014). Accompanying the benefits of technology in business operations are risks associated with technology (Jackson, 2012). IT risks result from malicious computer attacks, user errors, and IT disasters (Farah, 2011). According to Gill (2012), IT risks can negatively affect an institution's revenue if they remain unmanaged. At least one country, Singapore, developed a national technology framework to manage IT risks in financial institutions operating in the country (Monetary Authority of Singapore [MAS], 2014). Not all institutions have a national IT risk management framework to adopt. However, business

leaders can implement existing international standards or frameworks to manage these risks (Al-Ahmad & Mohammad, 2013; Svatá & Fleischmann, 2011).

Research on IT risk management exists in countries such as Singapore, the United Kingdom, and the United States. Further, research on financial performance exists in countries such as Bosnia, Herzegovina, Croatia, Serbia, Slovenia, Bangladesh, the United Kingdom, and the United States. However, scholarly articles on the relationship between the research variables in Jamaica are absent. The study findings might improve the knowledge of credit union leaders in Jamaica regarding factors affecting the institutions' financial performance.

Problem Statement

A negative association exists between unmanaged IT risk and financial performance of institutions (Goldstein, Chernobai, & Benaroch, 2011). Unmanaged technology risks such as data loss affected varying institutions in the United Kingdom and resulted in revenue losses of 6% for small companies and data breach costs exceeding £450,000 for large companies (Research Information Limited, 2012). The general business problem was that unmanaged IT risks have a negative influence on the financial performance of institutions of varying sizes (MAS, 2014). The specific business problem was that some institution leaders do not understand the relationship between IT risk management, institution size, and financial performance of credit unions in Jamaica.

Purpose Statement

The purpose of this quantitative correlation study was to examine the relationship between IT risk management, institution size, and financial performance of credit unions

in Jamaica. The independent variables were IT risk management and institution size. The dependent variable was financial performance. The targeted population included over 1000 credit union employees located in Jamaica, West Indies. The research results may contribute to the field of business and social change. Understanding the relationship between the variables could enable leaders of Jamaican credit unions and other financial institutions to improve business practices and financial performance. The study findings might assist Jamaican credit union leaders as they make strategic business decisions regarding the use of technology, the management of IT risks, and institution size. The improved financial performance of credit unions may foster an increase in financial contribution to Jamaican communities that could improve social conditions such as better education and greater financial security for over one million Jamaican credit union members.

Nature of the Study

There are three research methodologies: quantitative, qualitative, and mixed-method (Venkatesh, Brown, & Bala, 2013). However, the nature of this study was quantitative as the data for each research variable was measurable. Further, adequate literature exists to support the statements of hypotheses. This quantitative methodology was consistent with work undertaken by Goldstein et al. (2011) and Quaresma, Pereira, and Dias (2013). According to Kipo (2013), the quantitative methodology is the foundation of postpositive worldviews, which focus on empirical evidence during a given period. Quantitative methodology was appropriate to fulfill the objectives of the study because it fosters (a) the use of numeric information to determine if a relationship exists

between research variables; (b) the ability to collect information from random participants; (c) the use of ordinal, interval, or ratio scales; (d) the ability to advance the results from research to other population; and (e) the capability to incorporate postpositive worldviews (McLafferty, Slate, & Onwuegbuzie, 2010). Also, there was a need to test the efficacy of the risk IT theoretical constructs in predicting the financial performance (the problematic variable) of credit unions in Jamaica. The quantitative approach was used to address the purpose statement, research questions, and hypotheses, and provided information on the relationship between IT risk management, institution size, and financial performance. Section 2 contains detailed information on the methodology and specific processes of this study.

Researchers who employ qualitative methodology often seek to explore processes or meaning of the experiences of participants by asking why and how questions about a problem (Bailey, 2014) rather than testing a theory by examining the relationship between the research variables. Why and how questions in research would not have facilitated a quantifiable assessment of the three measurable research variables: IT risk management, institution size, and financial performance. Thus, the qualitative method was not suitable for this study.

A mixed-method study incorporates both qualitative and quantitative methods in a single study (Wisdom, Cavaleri, Onwuegbuzie, & Green, 2012). According to Wisdom, et al. (2012), mixed methodology highlights contradictions or paradoxes in the findings of the quantitative study using a qualitative strategy or vice versa. According to Venkatesh et al. (2013), researchers use the mixed-methods approach to address both

exploratory and confirmatory questions within the same research inquiry. A mixed methodology was not appropriate for this study because the focus was to test the risk IT constructs in predicting the problematic variable (financial performance) and not to explore the meaning of individual experiences or processes.

In this study, the quantitative correlational design was nonexperimental. A key focus of correlation designs is to determine whether a relationship exists between the study variables (Negussie & Demissie, 2013). Further, a nonexperimental design does not allow a researcher to manipulate the variables in a study (Negussie & Demissie, 2013). Conversely, a quasi-experimental design allows for statistical control of an experiment (Gupta, 2014). A nonexperimental correlation design was appropriate because the purpose of this study was to determine whether a relationship existed between the research variables without manipulation of these variables.

Research Question

The central research question that guided the study was the following: What is the relationship between IT risk management measured using a web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica?

Hypotheses

The focus of this study was to determine whether a relationship existed between three variables: IT risk management measured using a web-based survey, financial institution size measured by asset in dollars, and financial performance measured by the

institution's ROA. The following null and alternative hypotheses related to the research question:

Null hypothesis (H_0): There is no statistically significant relationship between IT risk management measured using a web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica.

Alternative hypothesis (H_1): There is a statistically significant relationship between IT risk management measured using a web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica.

I collected data using SurveyMonkey to measure the credit unions' IT risk management initiatives. Appendix C contains the survey questions used in this study. Independent audited financial statements provided data on the credit unions' assets measured in dollars. Published financial statements of credit unions in Jamaica also provided data for the independent variable financial performance measured by ROA.

Theoretical Framework

The international risk IT model, developed by Information Systems Audit and Control Association (ISACA), provides a comprehensive view of IT risks related to businesses (Svatá & Fleischmann, 2011). The premise of risk IT is that institution leaders can manage the risk associated with IT (Bakshi, 2012), seize business opportunities, and achieve a greater return on investments (MAS, 2014). The risk IT model became the

basis for this study. The risk IT model has two sections: the risk IT framework and the risk IT practitioner guide (Svatá & Fleischmann, 2011).

During 2008 and 2009, ISACA working groups consisting of 112 members from 18 countries worked with over 1700 other IT professionals to develop the risk IT model (ISACA, 2012). Specifically, the risk IT work groups comprised seven IT risk task forces, six development team members, 65 expert reviewers, 11 framework committee members, and 14 board members (ISACA, 2012). The ISACA work groups continue to provide IT support and updates to the risk IT model (ISACA, 2012).

The risk IT model addresses the gap in knowledge between enterprise risk management activities and IT risk management activities (ISACA, 2012). This model provides business leaders with a complete tool to manage IT-related business risks and provides guidance on decisions relating to risks associated with IT (ISACA, 2012). According to ISACA (2012), business leaders are (a) board of directors and executive management, (b) corporate and operational risk managers, (c) internal auditors and external auditors, (d) IT management, (e) enterprise governance managers, and (f) business managers. Risk governance, risk evaluation, and risk response are the key constructs of the risk IT model. The risk IT model was appropriate for this study on the relationship between IT risk management measured using web-based survey, institution size measured by asset in dollars, and financial performance measured by ROA.

Operational Definitions

Financial performance: The financial performance of an institution involves a review of the institution's accounting metrics such as profitability, growth, efficiency, and market share (Kotane, 2015).

Information technology (IT) risk: IT risk is the unavailability of computer software and hardware due to incidents such as denial of service attack, lack of expertise of IT personnel, loss of company's data due to theft; system malfunction or system glitches (Teilans et al., 2011).

Information technology (IT) risk management: IT risk management is the protection of information within the institution's technology infrastructure based on the organization's tolerance for risk and includes an assessment of the business impact of technology risks, the compliance requirements, and the alignment of technology with the organization's business strategy (ISACA, 2012).

Risk evaluation: Risk evaluation is the review of the influence of IT risk on an institution's performance (ISACA, 2012).

Risk governance: Risk governance is the maintenance of policies and procedures to reduce IT-related risks to an acceptable level (ISACA, 2012).

Risk management: Risk management is the process of identifying and managing IT-related risks. This process involves risk identification, risk assessment, and risk control activities (Gates, Nicholas, & Walker, 2012).

Risk response: Risk response is the execution of activities to manage IT-related risks (ISACA, 2012).

Assumptions, Limitations, and Delimitations

Assumptions

Kirkwood and Price (2013) defined assumptions as a researcher's position that determines the scope of inquiry in a study. Tabachnick and Fidell (2013) suggested that assumptions are norms that researchers take for granted or accept without verification. Donaldson, Qiu, and Luo (2013) argued that assumptions may involve characteristics about a target population, research methodology, and research data. According to Kirkwood and Price (2013), assumptions shape the design of a study and the conclusions drawn from the findings of a study.

This study relied on two sets of assumptions about (a) the research methodology and (b) the population and sample. A quantitative method was chosen and involved three assumptions. First, the research variables were measurable. Second, no relationship existed between the independent variables. Third, statistical analysis was sufficient to examine the relationship between the three research variables.

The second set of assumptions related to the population and sample. First, I assumed participants would respond to the survey questions honestly and accurately as there was no personal risk associated with participating in the study or any negative impact on the participant's credit union as outlined in the consent form. The second assumption was that ROA was a valid measure of the Jamaican credit unions' financial performance. Researchers such as Quaresma et al. (2013) and Ferrouhi (2014) suggested ROA is a valid measurement of an institution's financial performance.

Limitations

Horga, Kaur, and Peterson (2014) argued limitations are shortcomings uncontrollable by a researcher in a study. According to Horga et al. (2014), limitations place restrictions on the methodology used in a study and the conclusion drawn. Tabachnick and Fidell (2013) suggested limitations are unavoidable shortcomings surrounding the study. Leedy and Ormrod (2012) stated that limitations serve as precautions on the extent readers can generalize the research findings. This study had three limitations. First, the findings may not be generalizable to all the financial institutions operating in Jamaica because of the varying regulations governing the Jamaican financial industry. Second, the use of ROA to measure the financial performance of the credit unions may hide other quantifiable measures of financial performance. Third, limited information was available on the relationship between IT risk management, institution size, and financial performance in Jamaican credit unions. Thus, a thorough discussion regarding published quantitative studies within the last 5 years was absent.

Delimitations

Delen, Kuzev, and Uyar (2013) suggested delimitations are self-imposed limitations. Researchers such as Ionel-Alin and Irimie Emil (2013) and Donaldson et al. (2013), argued that delimitations are boundaries for a study. An essential delimitation of my study was the use of a web-based survey to collect data on the credit unions' IT risk management initiatives. According to Cardamone, Eboli, and Mazzulla (2014), a web-based survey fosters reliable data collection. The second delimitation was that the study

included credit unions' employees in positions of (a) executives, (b) department managers, (c) branch managers, (d) supervisors, (e) internal auditors, (f) IT workers, and (g) risk workers. Thus, participants' subordinates could not provide their feedback on the institution's IT risk management initiatives via the survey.

Significance of the Study

Contribution to Business Practice

The credit unions in Jamaica operate within the Jamaican financial industry and compete against commercial banks, building societies, and other financial institutions (Bankers Association of Jamaica [BAJ], 2015). According to Erdogan, Erdogan, and Omurbek (2015), the financial performance of an institution reflects the institution's profitability. Thus, leaders of institutions should measure and analyze financial ratios to determine the effectiveness of their business decisions in achieving profitability (Esbouei, Ghadikolaei, & Antucheviciebe, 2014). Further, there is a direct relationship between the financial performance of the institution and the decisions made by business leaders (Erdogan et al., 2015). Findings from this study could generate information to enable a better understanding of factors affecting the financial performance and profitability of the credit unions in Jamaica, which may guide strategic decisions made by the credit union leaders. As a continuation of the risk IT model research, findings from this study may add to the body of knowledge on factors influencing financial performance and credit unions.

Implications for Social Change

Credit unions do not pay corporate income tax (Tokle & Tokle, 2015). Their members, regarded as owners of the organizations, assist each other through their savings

(McKillop & Wilson, 2011). Monies saved in credit unions enable management to grant loans at favorable rates to other members (Jamaica Cooperative Credit Union League Limited [JCCUL], 2015a). Credit union leaders could use the information obtained from the study to guide business activities and enhance operational efficiency, which may result in improved financial performance of the institutions. The improved financial performance of credit unions might result in increased financial contribution by these institutions to the Jamaican communities through their social outreach events. Further, increased financial performance of Jamaican credit unions may lead to the improvement of the quality of life of over one million Jamaican credit union members as they use the affordable products and services of these institutions to pursue higher education, acquire a home, increase financial security, and obtain greater employment opportunities.

A Review of the Professional and Academic Literature

This quantitative correlation study involved the examination of the relationship between IT risk management, institution size, and financial performance of credit unions in Jamaica, West Indies. The research question for this study addressed the relationship between IT risk management, institution size, and financial performance of credit unions in Jamaica. The independent variables were IT risk management and institution size. The dependent variable was financial performance.

In the literature review, I used multiple peer-reviewed journal articles and information from statutory institutions' websites as well as from sites of other institutions. Key words for retrieving the electronic sources included the following: information technology, information systems, IT risks, IT risk management, risk

management, enterprise risk management financial institutions, credit unions, banks, and financial performance. To search with these keywords, I used Google Scholar and Walden University's electronic library databases including Academic Search Complete, Business Source Complete, Computers and Applied Science Complete, ABI/Inform Complete, Primary Complete, and ProQuest Dissertations. The key word search for the literature yielded more than 103 sources, of which 91 (88%) were peer-reviewed journal articles, one (0.97%) was a government publication, and 11 (10.7%) were publications from professional sites. In addition, 82 out of 91 references (90%) in the literature review were peer-reviewed articles published between 2012 and 2016. The literature review also included 91 of 103 (88%) publications dated between 2012 and 2016.

The literature review consists of seven categories. The first involves an examination of the theoretical framework, the model used in this study. The second category includes a review of rival theories of the risk IT framework. The third involves an examination of the instrument. The fourth, fifth, and sixth categories involve a review of the literature on the two independent variables (IT risk management and institution size) and the dependent variable (financial performance) respectively. The seventh category includes research on the methodological literature addressing financial performance.

Theoretical Framework

ISACA's risk IT was the model used in this study for the theoretical framework. According to ISACA (2012), an institution can manage risks associated with technology by implementing effective risk governance, risk evaluation, and risk response -- the three

key constructs of the model. The risk IT model contains two volumes: the risk IT framework and the risk IT practitioner's guide (Svatá & Fleischmann, 2011). The risk IT framework encourages institution leaders to (a) maintain a risk register, (b) define roles and responsibilities for IT risk management, and (c) define and communicate risk response (Bashki, 2012). In 2012, ISACA incorporated the risk IT framework along with other frameworks in Control Objectives for Information and Related Technology version 5 (COBIT 5) to assist management in IT governance and risk management activities (Debreceny, 2013).

Researchers such as Svatá and Fleischmann (2011), Svatá (2013), Bashki (2012), and Gill (2012) conducted studies involving the risk IT framework. Svatá (2013) included a review of international frameworks, which aids in the management of technology risks. These international frameworks include: (a) enterprise risk management -- integrated framework [COSO ERM]; (b) CCTA risk analysis management & methodology [CRAMM]; (c) the second of the basel accords [Basel II]; (d) operationally critical threat, asset, and vulnerability evaluation [OCTAVE]; (e) information security forum [ISF]; (f) International Organization for Standardization series [ISO 31000]; (g) Standards® New Zealand [AS/NZS 4360]; and (h) International Organization for Standardization series [ISO2700n] (Svatá, 2013).

Svatá and Fleischmann (2011) ranked the risk IT framework as the most appropriate framework to manage IT risks. According to Svatá and Fleischmann, the risk IT framework provides detailed coverage of IT risk management activities, which institution leaders can use to manage IT risks. Bashki (2012) conducted a case study on

the IT risk management framework used by India's largest stock exchange, National Stock Exchange (NSE). According to Bashki, the leaders of NSE chose the risk IT framework as the most appropriate framework to manage IT risk because the framework (a) fostered NSE risk governance process, (b) fostered risk monitoring, (c) integrated with operational activities, and (d) was adaptable to existing business process. In the study of information security risk and controls, Gill (2012) concluded that IT is essential to business success, and so risks associated with technology are business risks. Gill recommended the use of the risk IT framework to foster understanding and communication of IT risks that affect business operations.

Risk governance. Risk governance is the first of the three key constructs of the risk IT model. ISACA (2012) noted that risk governance is the governance of IT activities to manage risks associated with technology. According to ISACA, IT risk governance activities include (a) establishing and maintaining the institution's IT risk threshold by assessing the institution's risk appetite and tolerance, (b) establishing responsible and accountable risk governance officers, and (c) providing independent assurances for the management of IT risks.

Establishing and maintaining the institution's information technology risk threshold by assessing the institution's risk appetite and tolerance. Financial institutions face business risks daily in normal activities. These risks include credit risk, liquidity risk, regulatory risk, and operational risk (Haneef et al., 2012). Despite the importance of IT to businesses, some institutions consider IT risk as part of the institution's operational risk (Teilan et al., 2011). Rajendran (2012) explained there are four operational risk

categories: (a) process, (b) people, (c) systems, and (d) external. Effective management of operational risk requires (a) understanding the source of the risk, (b) assessing and treating the risk, and (c) monitoring the risk (Croitoru, 2014). According to Croitoru, operational risk monitoring includes tracking the threshold level of the risk based on the institution's risk tolerance. Risk tolerance is the level of risk an institution can accept (Institute of Risk Management [IRM], 2015). ISACA (2012) defined risk tolerance as the acceptable deviation from the established risk appetite of the institution. According to International Organization for Standard [ISO] (2015), risk appetite is the amount and type of risk an institution is willing to accept. The Institute of Internal Auditors (2014A) defined risk appetite as an institution's acceptable risk level as it pursues corporate objectives. IRM suggested that risk appetite is the degree of risk an institution is willing to accept in pursuit if its goals and may change over time. Both risk appetite and risk tolerance are integral components of an institution's enterprise risk management program and together establishes the institution's risk boundaries (Fox, 2012). Management's understanding of the institution's IT risk tolerance and appetite aids in determining the institution's IT risk threshold. Therefore, the establishment of an effective risk governance program to manage IT risks based on the institution's IT risk threshold is possible.

Establishing responsible and accountable risk governance officers. ISACA (2012) suggested for effective risk governance of technology, the key responsible and accountable officers in an institution include (a) board of directors, (b) executives, (c) IT management, (d) internal auditors, (e) human resource personnel, and (f) risk personnel.

These officers oversee (a) the development and communication of the institution's awareness and communication plan for IT risk, (b) the monitoring of IT risks, (c) the evaluation and selection of options to mitigate IT risks, (d) independent assessment of IT risk management, and (e) the assessment of internal controls for technology (ISACA, 2012). Technology and its associated risks are relevant to the board of directors and executives because of the institutions' capital and operational investment in technology to achieve the business objectives (Debreceny, 2013). The internal audit function involves IT risk assessment and reviews of internal controls for IT, and thus the internal auditors can aid in IT risk planning (Heroux & Fortin, 2013). Both the chief information officers CIO) and chief risk officers (CRO) are critical to the management of IT risks as they aid in prioritizing activities to manage these risks (Carcary, 2013).

Providing independent assurances for the management of information technology risks. ISACA (2012) posited that risk governance activities include providing independent assurance for the management of IT risks. Ibrahim (2014) suggested the internal audit team is responsible for ensuring that management understands IT risks and implement appropriate controls to manage these risks. Internal auditors can provide management with the assurance that IT goals and objectives align with those of the institution by conducting the general controls review and application controls review (Ibrahim, 2014). However, internal auditors are not the only group responsible for providing an independent assessment of an institution's risk management activities (Norman, Payne, & Vendrzyk, 2009). According to Norman et al., external auditors are also responsible for providing top executives with an assessment of the institution's

technology risk management initiatives. To effectively assess an institution's IT risk management activities, Mar (2014) recommended auditors develop an appropriate IT audit strategy.

The effect of risk governance for information technology on business performance. The reliance on technology by institutions to achieve business objectives is increasing (Carcary, 2013). However, to realize the benefits of technology in business, management of risks associated with technology is essential (Carcary, 2013). An IT risk governance program involves establishing an institution's threshold based on its appetite and tolerance. Understanding an institution's risk appetite and tolerance fosters informed risk decisions by management, which aids in reducing losses and allowing the institution to take advantage of new opportunities (Fox, 2012). Further, an effective risk governance program requires independent assessments of internal controls for IT. McNally (2015) suggested effective internal controls and risk management are essential to the achievement of an organization's vision, strategic plans and objectives, and delivering value to the organization's stakeholders.

Risk evaluation. The second key construct of the risk IT model is risk evaluation (ISACA, 2012). Risk evaluation includes (a) identifying and assessing risk, (b) estimating the risk, and (c) maintaining a risk register (ISACA, 2012). These risk evaluation activities form part of the risk evaluation process areas outlined in the risk IT model.

Identifying and assessing risk. The first phase of risk management involves risk identification. Risk identification is the detection of possible events that may affect an institution from achieving the objectives (Gorzen-Mitka, 2013). There are formal

methods and techniques that aid in the identification of risks within an institution (Institute of Risk Management, 2015). These methods and techniques include using a risk breakdown structure (RBS) and a risk breakdown matrix (RBM) for identifying risk (Cagliano, De Marco, Grimaldi, & Rafele, 2012). The risk breakdown structure is a hierarchical grouping of identified risks arranged by risk categories and causes of the risks (Project Management Institute [PMI], 2008). Researchers such as Loo, Abdul-Rahman, and Wang (2013) and Mehdizadeh, Breysse, Tailandier, and Niandou (2013) used RBS for risk identification in their studies involving construction, architectural, and engineering projects. Risk assessment involves reviewing the impact and likelihood of the occurrence of a risk (Gates et al., 2012). There are three risk assessment methods: (a) conducting a formal risk assessment, (b) examining the cause and impact of the risk, and (c) measuring the risk (Gates et al., 2012).

Estimating the risk. Risk estimation is present in medical studies undertaken by Challa, Swamyvela, and Shetty (2013) and Tonn and Stiefel (2013). Herrmann (2013) studied risk estimation in IT and suggested that the Delphi method to estimate risk provides a more reliable estimate than other risk estimation methods. The Delphi method involves selecting a panel of experts to provide their opinions on an issue (Guglyuvtyy & Stianoff, 2015). Despite its difficulty, risk estimation in IT is essential in assisting management to plan and prioritize risk management activities or prioritize IT requirements (Herrmann, 2013).

Maintaining a risk register. Literature regarding the risk register is available in disciplines such as project management and medicine (Baker et al., 2014; Hagel, 2014;

Simsekler, Card, Ruggeri, Ward, & Clarkson, 2015). A risk register is a tool that captures the risk tolerance, the potential risk events, and the probability of occurrence of the risk (Hagel, 2014). Baker et al., suggested that the risk register contains a list of threats, the probability of occurrence of these threats, and the impact of the threats. A risk register contains information such as the ranking of each identified risk, the estimated cost of the impact of the identified risk, and appropriate actions for each risk (Harding, 2014). Simsekler at al. stated that the risk register aids in risk identification in the health care system in the United Kingdom. According to Simsekler at al., the risk register contains risk information from varying sources including reports, patient complaints, claims, and internal and external audited reports. ISACA (2012) suggested that by maintaining a risk register management would be able to evaluate IT risks adequately.

Risk response. Risk response is the third key construct of risk IT model (ISACA, 2012). COSO (2004B) defined risk response as policies and procedures on how to respond to and manage risk. The four possible risk responses are (a) avoidance, (b) reduction, (c) sharing, and (d) acceptance (Gates et al., 2012). Risk response activities include (a) implementing controls, (b) communicating lessons learnt, and (c) monitoring risks (ISACA, 2012). Kutsch, Browning, and Hall (2014) highlighted the importance of risk response in mitigating risks. According to Kutschet al., risks in projects remain if no action is taken to reduce or eliminate the risks.

Implementing controls. The Institute of Internal Auditors [IIA] (2012B) suggested that implementing controls is a function of management in managing operations. An institution can manage operations by developing procedures, standards,

policies, and systems to minimize or mitigate risks associated with any identified exposure (IIA, 2012B). Ellul and Yerramilli (2013) reviewed bank-holding institutions in United States and stated that institutions with sufficient risk controls had lower tail risks and higher return on asset (ROA) compared to institutions without adequate risk controls. Implementing controls is part of the risk response activity recommended by ISACA (2012).

Communicating lessons learnt. Lessons learnt is learning from past experiences to improve future processes (NATO, 2011). An institution can reduce risks of previous mistakes by documenting lessons learnt (NATO, 2011). Hence, a lessons learnt document can serve as a reference point for the board of directors, executives, IT personnel, auditors, and risk personnel. Rhodes and Dawson (2013) recommended 10 activities that management could use to improve lessons learned in an institution. The recommendations include (a) acquiring an appropriate software to capture and store lessons learnt; (b) motivating employees to be part of the lessons learnt process; (c) highlighting success stories in a lessons learnt document; and (d) communicating lessons learned through formal training sessions, forums, notice boards, and newsletters (Rhodes & Dawson, 2013). Communicating lessons learnt is important for IT risk management (ISACA, 2012).

Monitoring risks. Monitoring risk is an essential activity for traditional and enterprise risk management program and involves ensuring that an established risk program is active (Simona-Iulia, 2014). Active monitoring of risk fosters the development of appropriate risk management strategies and procedures to mitigate

against identified risks (Croitoru, 2014). Risks such as system failure and changing regulation are technology risks affecting institutions engaged in cloud services (Babu, Babu, & Sekhar, 2013). Babu et al. (2013) recommended that such risks should be actively monitored to reduce the possibility of occurrence. Risk monitoring is part of the risk response activity and essential for IT risk management (ISACA, 2012).

Rival Theories of Risk Information Technology Model

Resourced based weakness is an alternate theory to review the relationship between IT risk management and financial performance. Using 25 years of data from financial institutions of varying sizes in the United States, Goldstein et al. (2011) reviewed the economic impact of operational IT risks using this theory. West and DeCastro (2001) suggested that resource based weakness is a process that impedes an organization from exploiting its competitive advantage. According to Goldstein et al., technology enables an organization to achieve competitive advantage. However, an institution's strategies that foster competitiveness may be ineffective if management does not understand and manage risks associated with technology.

Teilans et al. (2011) reviewed IT risk management problems in Latvian businesses and posited that IT risk management is complex. According to Teilans et al., organizations should adopt international frameworks to aid in managing IT risks. The international frameworks include ISACA's risk IT framework, International Organization for Standards Series (ISO 27000), Information Technology Infrastructure Library (ITIL), Control Objectives for Information and Related Technology (COBIT), basel II, basel III, PCI data security standard (PCI DSS), and OCTAVE (Al-Ahmad & Mohammad, 2013).

Nastase and Unchaiasu (2013) highlighted that basel II and basel III are risk management frameworks for the banking sector and classified IT risks as operational risks. According to Nastase and Unchaiasu, there are seven dimensions in which IT risks may germinate. These dimensions include (a) internal fraud, (b) external fraud, (c) employee activities, (d) business processes, (e) damage to physical asset, (f) system failure, and (g) process management. The Committee of Sponsoring Organizations of the Treadway Commission (COSO) framework is another international framework that leaders can use to manage IT risks. According to D'Aquila (2013) and Prawitt and Tysiac (2014), COSO can assist institution leaders in efficiently managing IT risks.

ISACA (2014), the governing body of risk IT model, suggested that COSO and COBIT 5 complement each other and enhance business value in institutions. ISACA (2015) incorporated the risk IT framework in COBIT 5. The COSO framework, developed in 1992, underwent its fourth enhancement in 2013 (COSO, 2014C). According to Rittenberg (2013), the decision by the COSO board to update its framework resulted from changes in technology and their associated risks. Salierno (2014) argued that changes in the business environment and risk management practices influence COSO board's decision to update the framework. The key principle of COSO framework is effective internal control (Vanderverlde, Brazel, Jones, & Walker, 2012). COSO has five control components that includes (a) establishing a controlled environment, (b) undertaking risk assessment, (c) developing control activities, (d) using information and communicating internally and externally, and (d) monitoring activities (Janvrin, Payne, Byrnes, Schneider & Curtis, 2012; Krstic & Dordevic, 2013). According to Duggan and

Peo (2013), the updated COSO focuses on strengthening the effectiveness of an institution's internal control process. The eleventh principle of the updated COSO provides management with detailed control activities for managing IT risks (D'Aquila, 2013). Similar to D'Aquila, White (2014) noted that the eleventh principle of COSO could assist auditors in assessing IT controls for IT infrastructure, personal computing, outsourced IT, and IT governance. These controls operate together to mitigate IT risks (White, 2014).

Despite the benefits of other IT risk management frameworks, the coverage of IT risk management in COSO is generic (Svatá & Fleischmann, 2011). To effectively manage technology risks, management should seek to obtain detailed information regarding these IT risks (Svatá & Fleischmann, 2011). Janvrin et al. (2012) suggested that COSO framework was inadequate to manage technology risks. According to Janvrin et al., technology is essential for businesses success, and so IT should be prominent in the COSO framework. However, Babb (2014) suggested that the enhanced COSO framework is comprehensive, and so management could perform effective IT risk governance activities including IT risk management. Al-Ahmad & Mohammad (2013) noted that management should develop and implement a selection model to identify the appropriate framework for the institution before adopting a framework to manage IT risk.

The Risk Information Technology Framework

Information technology risk management instrument. IT risk management is one of this study's independent variable. The instrument to measure IT risk management is a self-administered web-based survey with questions copied directly from the high-

level process activities in the risk IT framework. ISACA (2012) developed the risk IT framework to aid management in assessing the effectiveness of the institution's IT risk management initiatives. Prior quantitative study using the risk IT framework to measure IT risk management is absent. However, researchers such as Svatá and Fleischmann (2011) and Bashki (2012) suggested the risk IT framework is a practical framework to aid in the management of IT risk. Svatá and Fleischmann and Bashki conducted qualitative studies involving the use of the risk IT framework. Bashki concluded that the risk IT framework enabled India's National Stock Exchange (NSE) to quantify the likelihood and possible impact of IT risks on the institution. With this knowledge, the NSE leaders were able to develop and implement appropriate strategies to mitigate these risks. Svatá and Fleischmann concluded that institutions in the banking industry should adopt a framework, which provides completeness to their risk management process while providing in-depth coverage of IT.

The questions in the web-based survey aligned to the risk IT key constructs -- risk governance, risk evaluation, and risk response. Questions 1 through to 16 of the web-based survey sought to determine the effectiveness of the credit union's risk governance activities. Questions 17 through to 30 aided in assessing each credit union's risk evaluation activities. Questions 31 through 43 assisted in the assessment of the credit union's risk response activities. To provide a measure of an institution's IT risk management initiatives ISACA (2012) provided a maturity model. The values for the maturity model range from 0 to 5 with 5 being the highest rating or level and 0 being the lowest rating or level. The IT risk management level or score for an institution is

obtainable by averaging the weight of each process activity in each construct (ISACA, 2012). Progressing through level 0 through 5 is a reflection of the institution's progress in improving IT risk management activities corresponding to the risk IT processes (ISACA, 2012). Table 1 displays the possible score an institution can receive for its IT risk management initiatives and the meaning of each score.

Table 1

Score for Institution IT Risk Management Maturity Level

Level	Meaning
0	Management processes are not applied at all.
1	Processes are ad hoc and disorganized.
2	Processes follow a regular pattern.
3	Processes are documented and communicated
4	Processes are monitored and measured
5	Good processes are followed and automated

Note. Retrieved from ISACA. Copyright 2012 by ISACA. Reprinted with permission. Appendix D contains the permission to use the risk IT framework.

Maturity models are not new phenomena in research. Chen, Chen, and Wang (2014) developed a capability maturity model for cloud services (CS-CMM) that aided in establishing appropriate service integration using a shared platform. CS-CMM has five service maturity levels and six capability levels. The capability levels ranged from 0 to 5 with 0 being the lowest score and 5 being the highest score and the maturity level ranges from 1 to 5 (Chen et al., 2014). A maturity level of 5 indicates that the institution's process is optimizing (Chen et al., 2014).

Falessi, Shaw, and Mullen (2014) suggested that researchers and organization leaders use a maturity model such as the capability maturity model integration model (CMMI) to aid in improving business processes. The values for the capability level ranges from 2 to 5 with 2 being the lowest level and 5 being the highest level of optimization (Falessi et al., 2014). According to Falessi et al., over 5500 institutions worldwide use CMMI but only 344 institutions achieved level 5. Three percent of the 344 institutions operating at level 5 were small institutions (Falessi et al., 2014).

Maturity models for risk management also exist. According to Wieczorek-Kosmala (2014), a risk maturity model aids management in measuring an institution's risk management initiatives. In the study using Polish companies, Wieczorek-Kosmala (2014) used Hillson's Risk Maturity Model (HRMM), a risk management maturity model, to assess the maturity level of these institutions. HRMM has four levels with 4 being the highest level of optimization. Wieczorek-Kosmal stated that moving from one level to the next demonstrates the improvement in an institution's risk management activities.

Institution size. The asset is the proxy to measure the size of the Jamaican credit unions. The financial statements of these institutions provided values for the credit unions' sizes. In previous studies, researchers used asset as a proxy to measure an institution size. Adusei studied credit unions in Ghana and classified credit unions as small, medium or large after evaluating the asset in dollars of these institutions. According to Adusei, there is an inverse relationship between credit union size measured by asset in dollars and savings in these institutions.

Ngo, Mullineux, and Ly (2014) studied the impact of the size of operation on the financial performance of microfinance institutions (MFI) between 1996 and 2010. The study involved a review of microfinance operations in Africa, Asia, Eastern Europe, Central Asia, Middle East, North America, Latin America, and the Caribbean. Ngo et al. used the asset in United States dollars to classify the size of the microfinance operations as small, medium, or large. The study revealed that larger MFIs experience greater efficiency, financial performance, and sustainability compared to smaller MFIs. The Ngo et al. recommended that small MFIs in Ghana should merge.

Goddard, McKillop, and Wilson (2002) studied credit unions in the United States. Assets in dollars and membership size are suitable proxies for credit union size (Goddard et al., 2002). According to Goddard et al., not all credit unions strived for growth in assets, and therefore, membership size is a suitable alternative for measuring the size of credit unions.

Financial performance. Each Jamaican credit union's return on asset (ROA) measured the financial performance of the institution. Independent audited financial statements of credit unions provided values for the credit union's ROA. Vaidean (2014) used ROA as one of the financial indicators to measure the financial performance of Romanian institutions listed on the Bucharest Stock Exchange. In the quantitative study, Vaidean concluded that capital structure decisions influence the financial performance of institutions. Karim and Alam (2013) studied commercial banks in Bangladesh and used financial indicators such ROA, ROE, NIM, liquidity ratios, and liquidity gap analysis in their study. These indicators measured the financial performance of the commercial

banks in Bangladesh (Karim & Alam, 2013). Karim and Alam suggested that there is a positive correlation between ROA and asset management and a negative correlation between bank size, credit risk, and operation efficiency. In reviewing banks in Bosnia, Herzegovina, Croatia, Serbia, and Slovenia, Dreca (2012) used financial indicators such as CAR, the share of non-performing loan (NPL), ROA, ROE, and CAR to measure financial performance. Dreca suggested global financial crisis and internal activities in banks influenced their performance. Berrios (2013) used the financial indicators such as NIM, ROA, ROE, and cash flow to measure financial performance. Similarly, Berrios studied the relationship between bank credit risk, profitability, and liquidity and concluded that a positive relationship exists between prudent lending and NIM.

The standard financial indicators used by the researchers (Berrios, 2013; Dreca, 2012; Karim & Alam, 2013) to measure financial performance were ROA and ROE. Using data from secondary sources such as audited financial statements, the researchers (Berrios, 2013; Dreca, 2012; Karim & Alam, 2013) used the financial data to assess banks financial performance. Similar to banks, credit unions in Jamaica are deposit-taking financial organizations (BAJ, 2014). Financial indicators such as NIM, CAR, ROA, ROE, and cash flow can measure the financial performance of credit unions.

Information Technology Risk Management

There is an increasing reliance on technology in businesses to (a) maintain financial data, (b) manage operational risks, and (c) generate financial reports (Nastase & Unchiasu, 2013). However, there are risks associated with technology (Ibrahim, 2014). IT risks consist of (a) malfunction of computer hardware, software or network, (b)

insufficient IT staff knowledge, (c) loss of an institution's data, or (d) expired software licenses (Teilans et al., 2011). These risks are evident in (a) data leakage (Choi & Shin, 2014; Iovan & Dinu, 2014; Jinhyung, Park, Jun, & Hyung-Jong, 2013), (b) data loss (Al-Saiyd & Sail, 2013), (c) software project failure (Elzamly & Hussin, 2014), (d) system unavailability (Teilans et al., 2011) and (e) wrong IT investments (Barnier, 2011). With increased reliance on technology in businesses, the management of IT risks is crucial.

Gartner (2015) defined IT risk management as an on-going business process to protect an institution's electronic data. National Institute of Standard and Technology ([NIST], 2015) described IT risk management as a process of categorizing, selecting, implementing, assessing, authorizing, and monitoring risks associated with technology to an acceptable level. Tohidi (2011) suggested that IT risk management involves the management of risks associated with the implementation of technology.

Researchers such as D'Aquila and Houmes (2014) and Krstic and Dordevic, 2013) argued the management of IT risk is a subset of an institution's enterprise risk management program. Therefore, an effective enterprise management program involves the application of internal controls to manage risks including IT (D'Aquila & Houmes, 2014). Internal control is a process, which involves managing risk through policies and practices to ensure achievement of an institution's objectives, data protection, and regulatory compliance (Kapic, 2013). These risk management practices incorporate activities such as risk assessment, control activities, information and communication, and supervision (Kapic, 2013). Other researchers such as Ferguson, Green, Vaswani, and Wu (2013) reviewed IT risk management as part of an institution's IT governance program.

According to Ferguson et al., IT governance incorporates the monitoring and testing of IT risks in an institution. Debreceny (2013) also suggested IT risk management is a component of IT governance. Juiz and Toomey (2015) defined IT governance as a set of procedures that govern the implementation and use of IT. Despite IT risk management being a function of enterprise risk management or IT governance, Goldstein et al. (2011) suggested unmanaged IT risk affects the performance of an institution.

Using 25 years of data from financial institutions in the United States (US), Goldstein et al. reviewed the relationship between IT risk management and financial performance of organizations in the United States. Goldstein et al. concluded that institution leaders should manage IT risks as these risks affect the financial performance of the institution. Singapore's central bank, Monetary Authority of Singapore (MAS), reviewed the influence of IT risk on its financial industry and concluded that unmanaged IT risks negatively affects financial institutions' performance. Consequently in 2013, Singapore's central bank developed a national IT risk management framework to manage IT risk management activities in financial institutions operating in the country. Not all institutions have a national framework to aid in managing IT risks, and therefore management should use international frameworks as benchmarks for determining the effectiveness of their IT risk management initiatives (Al-Ahmad & Mohammad, 2013). However, Hardy and Williams (2010) suggested these international IT risk management frameworks are suitable for structured database management systems. According to Hardy and Williams, international frameworks do not address IT risk associated with (a) social network tools, (b) mobile devices, and (c) other unstructured information residing

in institutions. Despite the limitation identified by Hardy and Williams, Svatá (2013) recommended the use of international frameworks for managing IT risk in an institution.

Institution Size

Researchers such as Ling, Zain, and Jaffer (2014) and Arora (2012) reviewed the relationship between risk management and institution size. According to Ling et al., a risk management committee is part of an institution's governance activities and is responsible for reviewing risk management strategies, policies, and procedures. Having analyzed 796 publicly held institutions in Malaysia, Ling et al. concluded that there is a positive relationship between institution size and the establishment of a risk monitoring committee (Ling et al., 2014).

Arora reviewed the relationship between credit risk management (CRM) and institution size using data from 35 commercial Indian banks. The asset was the proxy for institution size. According to Arora, credit risk management involves strategies to manage credit risks without compromising on the institution's credit operation. The findings indicated that larger banks in India focused on CRM structure, frequency of credit risk review, and stress testing while smaller banks focused on portfolio risk model and managing credit issues. Arora suggested that larger banks should deploy a centralized CRM to ensure uniformity in risk management activities.

Researchers such as Brewer and Jagtiani (2013) also reviewed the relationship between institution size and financial performance. In their quantitative study of banks being too big to fail, Brewer and Jagtiani used asset of banks as a proxy for the size of the banks. Large banks were banks having total assets greater than $100 billion dollars

(Brewer & Jagtiani, 2013). Using the asset of banks as a proxy for bank size, Brewer and Jagtiani concluded that large banking organizations enjoyed greater benefits compared to other organizations. Further, the market perceived larger institutions as financially safe compared to other institutions (Brewer & Jagtiani, 2013).

Ismail (2014) studied the relationship between institution performance, size, and leverage of the institution. In contrast to Brewer and Jagtiani (2013), Ismail suggested that there is a negative correlation between institution size and financial performance in public institutions in Malaysia. Ismail measured the economic value added (EVA) of the Malaysian's institutions between the period 1999 and 2002 and noted that the financial performance of institutions decreased with size.

There are varying proxies used by researchers to measure the size of an institution. In their study, Stella, Aggrey, and Eseza (2014) used the number of employees as the proxy for the size of manufacturing institutions in Uganda. According Stella, Aggrey, and Eseza, small institutions employ less than 50 workers, medium institutions employ between 50 and 100 workers, and large institutions employ over 100 workers.

Using total asset as a proxy for institution size is common in studies undertaken in India, China, Ghana, United States, and Jamaica. Azhagaiah and Silambarasan (2014) used total asset value to group cement institutions in India into three categories: small, medium, or large. The authors reviewed the impact of institution size on the determinant of corporate leverage in 29 institutions listed on Bombay stock exchange. Azhagaiah and

Silambarasan concluded that irrespective of the institution size, there is high volatility in the corporate leverage of these institutions.

The Jamaican credit unions' supervisory body, Jamaica Cooperative Credit Union League (JCCUL), uses credit unions' assets in dollars as a proxy for these institutions sizes (JCCUL, 2014). JCCUL classifies credit unions in groups, which are (a) less than $300 million dollars, (b) greater than $300 million dollars but less than $1 billion dollars, (c) $1 billion dollars to $2 billion dollars, and (d) greater than $2 billion dollars (Jamaica Cooperative Credit Union League Limited, 2014b). The literature reflects that asset in dollars is an appropriate proxy for institution size.

Financial Performance

In the dynamic business environment, business leaders make decisions to achieve their primary business objectives. These decisions may involve reviewing risks that affect the institution's financial performance and implementing appropriate strategies to mitigate these risks. Quaresma et al. (2013) quantitative study involved a review of corporate governance, risk management, and financial performance in internationally listed banks. According to Quaresma et al., corporate governance involved effective risk management activities, and there is a positive relationship between corporate governance and the institution's financial performance.

Baxter, Bedard, Hoitash, and Yezegel (2013) also conducted a quantitative study on the impact of risk management on financial performance. Baxter et al. reviewed data from S&P Rating Direct database and used descriptive statistics to display results from their data analysis. According to Baxter et al., institutions with high-quality controls that

incorporate risk management experience stronger financial returns than institutions with weaker quality controls that include risk management.

Lindo (2013) reviewed risk management in financial institutions. According to Lindo, an institution's risk management system comprises of its operating system and its information management system. Lindo suggested that risk management activities are critical for financial institutions and affect their financial performance.

Institutions need to measure the effectiveness of business decisions, and therefore management should review and analyze the financial performance of their institutions (Erdogan et al., 2015; Esbouei et al., 2014). Accounting indicators such as return on asset (ROA), return on equity (ROE), return on investment (ROI), capital adequacy ratio (CAR), and net interest margin (NIM) measures the financial performance of an institution (Dreca, 2012; Karim & Alam, 2013; Berrios, 2013, Quaresma et al, 2013). Ferrouhi (2014) suggests that the following calculations for ROA, ROE, and NIM.

$$\text{ROA} = \frac{\text{Net Income}}{\text{Total asset}} \times 100$$

$$\text{ROE} = \frac{\text{Net Income}}{\text{Shareholders Equity}} \times 100$$

$$\text{NIM} = \frac{\text{Total interest income} - \text{Total interest expense}}{\text{Total Earning Assets}}$$

According to Ferrouhi, ROA measures an institution's overall performance, ROE measures the institution's profit based on shareholders' investment, and NIM is the gap between the amount paid to savers and received from borrowers. The financial indicators

used by Bank of Jamaica (BOJ) to measure the performance of Jamaican financial institutions include asset growth, return on average assets (ROAA), CAR, income to expense, and pretax profit margin (BOJ, 2014). These financial indicators are consistent with the indicators used by researchers such as Dreca, Karim and Alam, and Berrios.

Review of Methodological Literature Addressing Financial Performance

Prior studies involving a review of an institution's financial performance used all three research methodologies. Evans, Hodder, and Hopkins (2014) conducted a quantitative study on the association between the fair value of interest-bearing securities and future financial performance of 7,794 banks between 1994 and 2008 in the United States. Evans et al. used descriptive statistics to present their data and concluded that there is a positive association between future income from securities and the fair value adjustments of these securities.

Goldstein et al. (2011) conducted a quantitative study on the economic impact of IT risk on financial institutions in the United States. Goldstein et al. reviewed data from the Financial Institutions Risk Scenario Trends (FIRST) database for the period 1985 to 2009. Goldstein et al. displayed their study's data using descriptive statistics and conducted a regression test. The finding by Goldstein et al. was that IT risk is a major risk, and so business leaders should understand, identify, and manage the risk.

El-Chaarani (2015) conducted a study on the impact of capital structure on the financial performance of 5050 listed institutions in eight European countries. El-Chaarani undertook a regression analysis test and used descriptive statistics to present the study's

data. Having analyzed the data, El-Chaarani concluded that the financial performance increases with high levels of legal protection.

Berrios (2013) also conducted a quantitative correlation study on the relationship between bank credit risk and financial performance. The research data originated from Merchant database. Similar to Evans et al. (2014) and El-Chaarani (2015), Berrios used descriptive statistics to display the data. The findings indicated that a negative relationship exists between less prudent lending and financial performance measured using net interest margin.

Tai (2015) quantitative study involved an examination of the impact of corporate governance on the efficiency and financial performance of banks. Tai examined the financial performance of 57 publicly listed banks in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE) between 2011 and 2013. Both ROA and ROE were the proxies for financial performance. The study involved multiple regression tests, and descriptive statistics was used to display the data. The study findings revealed that the size of the board, block shareholding and the type of bank affected the financial performance of these banks.

Fabling, Grimes, and Stevens (2012) conducted a mixed-method study on the financial performance of institutions in New Zealand between 2005 and 2007. Fabling et al. sought to determine the robustness of qualitative responses to the financial performance of an institution. The qualitative questions focused on the institution's financial performance and the quantitative questions focused on the institution's finances and employment. Fabling et al. added *don't know* category to the qualitative responses

and found that the productivity and financial performance of don't know institutions were predominantly lower than high performing institutions.

Shah and Dubay (2013) reviewed the influence of the market orientation on the financial performance, institution size, market share, and growth of financial institutions in the United Arab Emirates. The study involved a quantitative correlation design and descriptive statistics. Shah and Dubay used ROA, ROE, return on investment (ROI), and earnings per share (EPS) to measure the financial performance of financial institutions. The findings revealed that there was a positive relationship between market orientation and financial performance, institution size, market share, and business growth.

Teilans et al. (2011) conducted qualitative research on IT risk assessment in businesses in Latvia. Using a flow chart, Teilans et al. demonstrated the prototype for IT risk assessment support system and financial implication of unmanaged technology risk. Teilans et al. concluded that business leaders should implement IT governance mechanism to create an effective strategy to manage IT risks.

The literature on financial performance involved all three research methodologies: quantitative, qualitative, and mixed methodologies. Quantitative studies include testing of a research hypothesis (Venkatesh et al, 2013). From the review of the literature, a quantitative methodology was an appropriate method to examine the relationship between IT risk management measured using web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA.

Summary

Factors affecting an institution's financial performance have left a gap in research on the relationship between IT risk management, institution size, and the financial performance of credit unions in Jamaica. Previous studies involved reviews on the impact of institution size or unmanaged IT risks on an institution's financial performance. Researchers demonstrated the appropriateness of the risk IT framework to measure an institution's IT risk management initiatives and asset in dollars to measure an institution's size. In the literature, researchers substantiated the suitability of using ROA as the measurement of an institution's financial performance.

The publications within the literature review included articles between 2002 and 2015 and addressed each research variable. The discussion on each research variable was essential to answer the central research question on the relationship between IT risk management measured using a web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica. The importance of IT risk management and institution size in maintaining positive financial performance in credit unions in Jamaica emerged as a significant problem because some leaders do not understand the relationship between the research variables in Jamaican credit unions. Information gathered in this study may fill gaps in business coupled with collected data to answer the research question.

Transition

Section 1 was an introduction to the study on the relationship between IT risk management, institution size, and the financial performance of credit unions in Jamaica.

The content of Section 1 included an overview of the study and a discussion on the background of the study. Also, Section 1included the problem statement, the purpose statement, the nature of the research, the research questions, the definition of terms, and the theoretical framework. The purpose of the quantitative correlation study was to examine whether a relationship existed between the study variables. The chosen method to obtain a measure of an institution's IT risk management initiatives was a web-based survey developed directly from the high-level objectives of the risk IT framework. Published audited financial statements provided data for institution size and financial performance. Combined, the data from the survey and published financial statements assisted in answering the research question. The content of Section 1 also included the literature review. The literature review contained information regarding the theoretical framework, the instrument, and literature on the study variables.

In the subsequent section, Section 2, a detailed review of the research method and design of the study are present. An outline of the data collection method and the sampling method exist. Strategies to ensure reliability and validity of the proposed research are present along with the data collection instruments, techniques used to collect data and systems used to track and secure data. Section 3 includes the results of the study and a discussion on how the research findings support or reject the null hypothesis.

Section 2: The Project

Section 2 includes a detailed review of the research methodology and design processes. Section 2 also includes a description of the techniques, procedures, and methods used in this study. I conducted a quantitative correlation study on the relationship between IT risk management measured using web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA. This section presents the purpose of the study, a description of my role as the researcher, and an identification of the participants in the study. Section 2 also includes a description of the research method, research design, population, data collection process, and data analysis process. I also describe the instrument, data collection techniques, data organization techniques, data analysis techniques and reliability and validity of the study.

Purpose Statement

The purpose of this quantitative correlation study was to examine the relationship between IT risk management, institution size, and financial performance of credit unions in Jamaica. The independent variables were IT risk management and institution size. The dependent variable was financial performance. The targeted population included over 1000 credit union employees located in Jamaica, West Indies. The research results may contribute to the field of business and social change. Understanding the relationship between the variables could enable leaders of Jamaican credit unions and other financial institutions to improve business practices and financial performance. The study findings might assist Jamaican credit union leaders as they make strategic business decisions regarding the use of technology, the management of IT risks, and institution size. The

improved financial performance of credit unions may foster an increase in financial contribution to Jamaican communities that could improve social conditions such as better education and greater financial security for over one million Jamaican credit union members.

Role of the Researcher

My role as the researcher in this study was to (a) ensure the research instrument was appropriate, (b) ensure the web-based survey was accessible, (c) contact participants, (d) ensure none violation of participants' rights in accordance with Belmont Report (United States Department of Health & Human Services, 2015), and (e) encourage participation. The Belmont Report (1979) defined three basic ethical principles: respect for persons, respect for beneficence, and respect for justice. I outlined the objective of my study to the participants and advised them that they could withdraw from the study at any time. I also received consent from the participants before granting access to the web-based survey and maintained the privacy of participants to eliminate any risks associated with participating in the study. During the study, a confirmatory factor analysis (CFA) test and a Cronbach's alpha test were used to verify the research instrument's validity and reliability. I analyzed the research data and presented the research findings in Section 3. The activities of analyzing the research data and presenting the findings in Section 3 are similar to the activities performed by Saffer (2014) in his quantitative study.

My professional experiences as a programmer, systems analyst, and IT manager in a statutory institution, a private IT development organization, and a credit union exposed me to various financial operations and IT management environments. These

experiences propelled me to examine the relationship between the research variables and to choose Jamaican credit unions as the study population. To ensure research objectivity, I excluded IT personnel under my supervision as a current manager in a Jamaican credit union. I do not have any financial holdings in any credit union in Jamaica that would affect research objectivity.

Participants

This study involved 130 Jamaican credit union employees who held positions as (a) executives, (b) department managers, (c) branch managers, (d) supervisors, (e) internal auditors, (f) IT workers, and (g) risk workers. I chose these employees because they had knowledge of the research topic. The credit union employees provided information on the credit unions' IT risk management initiatives by answering the questions in the web-based survey. Researchers such as Hall, Enright, White, and Allen, (2015) used pharmacists as participants in their study on the emotional intelligence of pharmacists affiliated with the ASHP Research and Education Foundation's Pharmacy Leadership Academy. In a quantitative study of IT governance in small businesses, Saffer (2014) solicited participation from owners and senior managers from small, privately held manufacturing firms located in New Jersey. Adusei (2013) reviewed the growth in credit union savings of males and females living in Ghana in his study of the determinants of credit union savings in Ghana. Saffer and Adusei chose participants who had knowledge of their research topics.

I used G*Power 3.1 software to compute the sample size for this study, which allowed for the maintenance of a confidence level of 80%. Atul and Shashi (2015)

suggested obtaining an appropriate sample from the target population is fundamental to good research. The computed sample size for this study using G* Power was 68 participants. However, this study involved conducting a CFA test, which required a larger sample. Therefore, a sample of 150 was appropriate for the study.

I made initial contact with the research participants via email. Using e-mail requests to recruit participants capitalizes on a shared resource that serves as a significant component to leaders of institutions (Truong et al., 2013). The email request contained an introductory letter to the credit union leaders, which outlined (a) background and purpose of the study, (b) procedure for the study, (c) link to the web-based study, (d) an estimate of the time required to complete the survey, and (e) my contact information including my mobile number. After receiving approval from credit union leaders to conduct the survey, I requested a list of all eligible credit union employees along with the employees' titles and contact information from the credit union leaders. The number of submitted participants' information was below the initial sample of 150; and therefore selecting participants randomly using Statistical Package for the Social Science (SPSS) random generator feature was unnecessary. Random sampling was the chosen sampling method for this study. According to Acharya, Prakash, Saxena, and Nigan (2013), Emerson (2015), and Zafar, Bhattacharya, Ganguly, Gummachi, and Ghosh (2015), random sampling facilitates unbiased results because each participant has equal opportunity to participate in the research.

Using my Walden University email account and SurveyMonkey® request feature, I sent a request for participation to each participant. Sending emails to potential

participants requesting their involvement in a web-based survey is similar to activities undertaken by previous researchers such as Kaplowitz, Lupi, Couper, and Thorp (2012), McPeake, Bateson and O'Neil (2014), and Saffer (2014). Saffer solicited participation in the study on IT governance in small businesses by emailing the participants. The email included information relating to (a) the rights of the participants, which included the right to withdraw at any time; (b) the absence of compensation for the participants; (c) the research procedures; and (d) the 5-year data retention period. Credit unions employees participated voluntarily in my web-based survey. The responses provided data for the ordinal variable IT risk management. Participants did not provide data for the variables institution size and financial performance because published financial statements provided data for these variables. I communicated with the credit union leaders over a 6-week period to encourage participation in the study. Each participant received a time extension of 2 weeks to participate in the web-based survey. Failing to receive additional responses over a 10-day period, I closed the survey.

Research Method and Design

The three research methodologies are quantitative, qualitative, and mixed- method (Venkatesh et al., 2013). However, this study involved quantitative research because the purpose was to examine the relationship between three research variables. A quantitative study fosters the use of descriptive statistics to describe the features of the data in research (Baxter et al., 2013). Further, a quantitative research fosters the use of multiple regression tests to understand the relationship between independent variables and the dependent variable (Tai, 2015).

Method

The primary objective of quantitative methodology is to test theories or relationships between research variables (Frels & Onwuegbuzie, 2013; McLafferty et al., 2010). Trafimow (2014) contended that quantitative researchers collect, analyze, and establish a conclusion using statistical evidence from the garnered information to test a research theory or hypothesis. The research variables for this study were measurable, and so I collected, analyzed, and established a conclusion using garnered data. Further, there was a need to test the effectiveness of the risk IT theoretical constructs in predicting the financial performance of Jamaican credit unions. Consequently, the quantitative method was the appropriate research method to test the numeric data, obtainable from the research population, to determine whether IT risk management affects the financial performance of institutions of varying sizes.

Qualitative researchers ask how and why questions to obtain a detailed understanding of a phenomenon (Gillespie, Dietz, & Lockey, 2014). According to Sanjari, Bahramnezhad, Famani, Shoghi, and Cheraghi (2014), qualitative researchers focus on the philosophy of a phenomenon. Qualitative research involves the use of textual information of lived and perceived experiences of participants (Rocha-Pereira, 2012). The purpose of this study was to use data from credit unions in Jamaica, West Indies to conduct an assessment of measurable variables: IT risk management, institution size, and financial performance. Textual information and how and why questions would not facilitate this assessment or facilitate the testing of a theory by examining the

relationship between the variables. Therefore, a qualitative method was not appropriate for this study.

A mixed-method study incorporates both quantitative and qualitative methodology in a single study (Kipo, 2013; Wisdom et al., 2012). According to Fabling et al. (2012), a mixed methodology provides for a rich and broad understanding of research results. Researchers include qualitative and quantitative data for instrument and theory development or to address exploratory and confirmatory questions within the same research inquiry (Venkatesh et al., 2013). Neither of these rationales rendered a mixed-method approach appropriate for my study because the purpose was to test the risk IT constructs in predicting the problematic variable (financial performance) and not to explore the meaning of individual experiences or processes. Consequently, a mixed-method approach was not appropriate for this study.

Research Design

The study involved a nonexperimental design. Researchers such as Hunsaker, Chen, Maughan, and Heastin (2015) used nonexperimental design to demonstrate the relationship between their research variables. My study also involved the examination of the relationship between the study variables to arrive at a conclusion. Further, the purpose of my study was not to demonstrate a cause and effect relationship between the research variables. Therefore, the nonexperimental design was appropriate for this study.

An experimental design was unsuitable for answering the research question in this study. Researchers use an experimental design to test theories by manipulating the conditions of the variables or participants (Serier, Benamara, Megueni, & Refassi, 2015).

Further, researchers use experimental designs to make causal inferences between independent and dependent variables (Herrewijin & Poels, 2013). My study did not involve an examination of the causal relationship between the two independent variables and the dependent variable. I did not manipulate the variables or participants in this study; hence an experimental design was inappropriate. A quasi-experimental design is appropriate for testing a causal hypothesis (Eyyam & Yaratan, 2014). There was no attempt to examine the cause-effect relationship between the three research variables in my study. Therefore, the quasi-experimental design was unsuitable for this study.

Population and Sampling

This study involved a review of the relationship between IT risk management, institution size, and financial performance of credit unions in Jamaica. The population for this study included over 1000 credit unions employees located in Jamaica, West Indies. The Jamaican credit union employees included executives, managers, supervisors, and nonmanagement staff members across credit unions' offices and branch networks. Eligible employees were credit union employees who were executives, managers, supervisors, IT employees, risk employees or audit employees. Vaidean (2014) studied the financial performance and capital structure of Romanian companies using Romanian financial institutions as the population. Karim and Alam (2013) reviewed the financial performance of private commercial banks in Bangladesh using data from commercial banks in Bangladesh. Dreca (2012) reviewed the financial performance of banks in Bosnia, Herzegovina, Croatia, Serbia and Slovenia using data from banks in these

countries. The population used by Vaiden, Karim and Alam, and Dreca were appropriate for their studies.

I requested permission from each of the 34 credit union leaders in Jamaica to conduct an electronic survey involving eligible employees. After receiving approval from 15 credit union leaders, I requested a list of all eligible employees with their job titles and email addresses. Thirteen credit union leaders provided the required information for the participants, which resulted in 130 eligible participants. I emailed the participants using my Walden University email account to establish credibility as an academic researcher.

Sample Size

I used a sampling frame to gather data on IT risk management. My sampling frame consisted of 130 credit union employees. The sampling method included a probabilistic simple random process of randomly sampling eligible employees from the sample frame. Random sampling fosters (a) reduced cost and time of gathering data compared to collecting data from all participants, (b) high internal and external validity, (c) reliable results, and (d) objectivity in distribution about an unknown population (Acharya et al., 2013; Meenden, 2012; Park et al.,2012). Further, random sampling enables a participant to have an equal opportunity to participate in a study (Busch & Gick, 2012; Emerson, 2015; and Zafar et al., 2015; Park et al., 2012).

Pye, Taylor, Clay-Williams, and Braithwaite (2016) suggested that inappropriate sample size can render a study unethical, unpublishable, or both. I used G*Power version 3 software to compute the sample size for the study. Balkin and Sheperis (2011) contended the use of G*Power can help researchers to identify the appropriate sample

size required for their study before data collection and analysis. Saffer (2014) used G*Power to estimate the sample size for the study on IT governance in small business. A priori power analysis for a multiple linear regression analysis using a significance level (α) of 0.05 and a medium effect size ($f = .15$) indicated that a minimum sample size of 68 participants was necessary to achieve a power of 0.80 (Figure 1).

The effect size is the number of samples that yields the same result from a simple random procedure (Hulson, Hanselman, & Quinn, 2012). Bradley and Brand (2013) suggested the purpose of using effect size in research is for accurate measurement. Bosco, Singh, Aguinis, Field, and Pierce (2015) and Cohen (1992) contended the three effect size conventions are small, medium, and large. According to Bosco et al., using the medium effect size is appropriate for research and may vary across research domains, constructs, and measures. Eisend (2015) confirmed the appropriateness of using a medium effect size in research. In his quantitative study, Eisend indicated that the medium size effect was 0.24. Combining data from 176 meta-analyses including data from over 7500 marketing literature between the period of 1918 and 2012, Eisend concluded that the growth rate of marketing knowledge is decreasing. Balkin and Sheperis (2011) also demonstrated that using a medium effect size when computing the sample size for a quantitative study using G*Power is appropriate in research. Balkin and Sheperis reviewed statistical power in counseling studies and contended researchers waste time in studies with inadequate power because of low sample size. Using G*Power software, the convention for a small effect size is .02, the medium effect size is 0.15, and the large effect size is 0.35. This medium effect size computed by G*Power software was

consistent with studies involving behaviour. Bosco et al. argued the medium effect size for studies involving behavior range between 0.1 and 0.25.

The significance level of 0.05 is consistent with the significance used by researchers such Bubakova (2015), Ilott et al. (2014), and Olalekan and Tajudeen (2015). In the study of the law of one price (LOP) using data from Central European, Bubakova used a significance level of 0.05. Bubakova accepted the null hypothesis and concluded that LOP in the majority of the markets was equal. Similary Ilott et al. used a significance level of 0.05 in the study on dysphagia management. According to Ilott et al., workplace-based blended e-learning was an acceptable cost-effective method of learning about dysphagia. Olalekan and Tajudeen (2015) also used a significance level of 0.05 in the quantitative study on cost control in Nigerian businesses. Using data from 30 randomly selected participants, Olalekan and Tajudeen accepted the alternative hypothesis, which is that cost control in firms greatly helped in boosting profitability.

Researchers such as McBride, Fider, and Burgman (2012) used 80% confidence interval (CI) in their study of experts being able to predict outcomes of variables in uncertainty. This CI enabled McBride et al. to conclude that experts need additional training to communicate knowledge accurately. Similarly, researchers such as Ben-David, Graham, and Harvey (2013) used 80% confidence interval in the study on managerial miscalibration and suggested that there is a relationship between CFO miscalibration and corporate decision making. Other researchers such as Mezuk, Lohman, Leslie, and Powell (2015) used a 95% confidence interval in their study and concluded that long-term care may be important for suicide intervention.

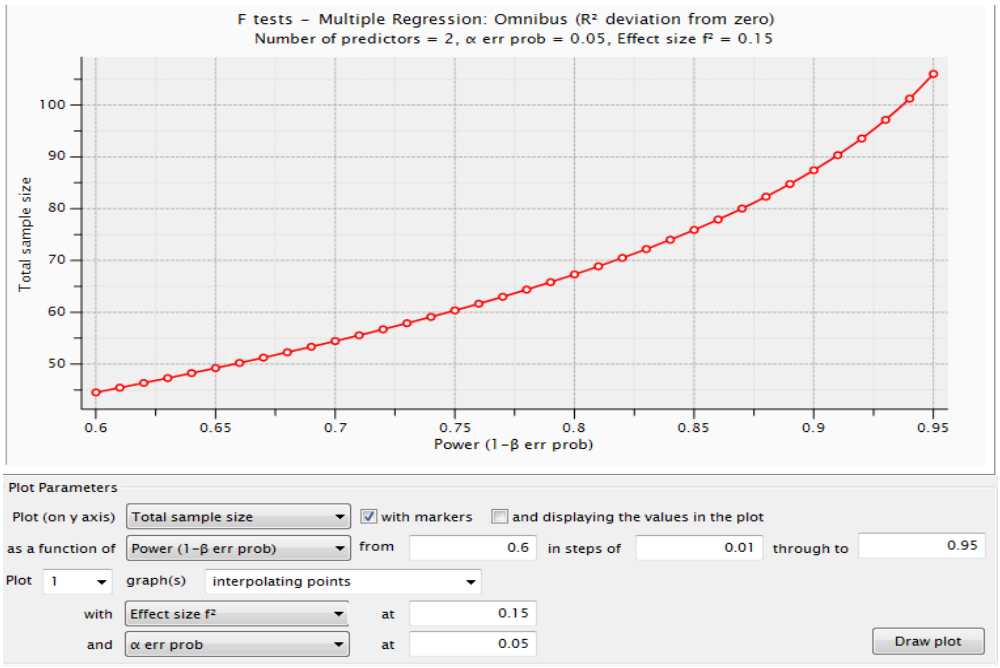


Figure 1. Power as a function of sample size. From Faul, F. Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analysis using G*3.1: Test for correlation and regression analysis. *Behaviour Research Methods*, *41*, 1149-1160. Download PDF. Printed with permission.

To confirm the validity of the risk IT framework, a CFA test was necessary, and therefore a sample larger than 68 was essential. Researchers such as Choi, Son, Lee, and Cho (2015), Drugli and Hjemdal (2013), Feldt, Lee, and Dew (2014), and Roy, Vyas, and Jain (2013) used varying sample sizes to test the validity of the research instruments. Using a sample size of 132, Roy et al. (2013) tested the validity of the research instrument by conducting a CFA test on the data using IBM SPSS Amos® software. Roy et al. (2013) sent 146 questionnaires to small and medium sized personnel and received 132 completed survey responses. Roy et al. (2013) evaluated the survey responses and concluded that the instrument was valid. Similarly, researchers such as Choi et al. (2015)

undertook a CFA test to test the validity of the research instrument using the Amos® software. Choi et al. (2015) used a sample size of 150 patients and concluded that the short-form McGill pain questionnaire was valid. Feldt et al. (2014) used a sample size of 295 to confirm the validity of the Big Five Inventory instrument. Feldt et al. (2014) conducted a CFA test and concluded that the 44-item Big Five Inventory instrument was valid. Drugli and Hjemdal (2013) conducted a CFA test to verify the validity of the Student-Teacher Relationship Scale using a sample size of 863 participants. Drugli and Hjemdal (2013) concluded that the instrument was valid. However, Malhotra and Sharma (2008) argued a sample size greater than 100 is necessary when conducting a CFA test. Similar to Choi et al. (2015), I sought a minimum of 150 participants from the credit unions in Jamaica for this study. The number of participants for the web-based survey was below 150, and therefore using SPSS® random generator feature to generate a list of random participants was unnecessary.

Ethical Research

Scholarly researchers adhere to procedures that ensure the rights and safety of research participants (Resnik, Miller, Kwok, Engel, & Sandler, 2015; Rothstein, 2015). According to Vanclay, Baines, and Taylor (2013), researchers have a responsibility to adhere to ethical practices. Ethical practices include communicating the research objectives with participants before the data collection phase (Rothstein, 2015). Walden University has research protocols that are mandatory for doctoral students. These protocols include maintaining the rights and safety of the participants and informing the participants of the study's objectives. After receiving approval to undertake the study

from Walden University's Internal Review Board (Walden University IRB), I submitted an introductory letter to Jamaican credit union leaders. The introductory letter contained (a) the proposed benefits of the study, (b) a statement indicating the participant's right to withdraw from the study, and (c) my Walden University email that participants can use to contact me if there were any concerns regarding the survey. My introductory letter contained written assurance guaranteeing participant's privacy. Appendix A contains a copy of the letter of participation to the credit union leaders. Scott and Olikowski (2014) suggested that privacy is freedom from identification and lack of distinction. Privacy for each participant was achieved by sequentially numbering each respondent using SurveyMonkey® unique 10 digit identifier. Humayun, Ashar, and Ahmad (2014) numerically tagged each survey respondent using a unique number in their mixed-method study on student's perception of labor room learning environment. Some credit union leaders did not grant permission for their employees to participate in this study. I did not receive a request to destroy any data because participants did not withdraw from the study after their initial consent.

Obedience to the laws and regulations of Jamaica and United States regarding the treatment of human participants in the study was critical. Participants were able to participate in the web-based survey after agreeing to the study protocols presented on the first page of the survey. The consent form explicitly stated that the participants would not receive any incentive to participate in the study. Appendix B contains a copy of the consent form for the participants. As a requirement for the doctoral study, I stored the raw data for the study on an encrypted USB drive in a locked drawer at my house during

the data analysis phase. I will store the USB drive with the research data at a financial institution for 5 years after the completion of this study.

Data Collection Instruments

The study contained primary and secondary data. Completed web-based surveys by participants provided primary data for this study. Responses to the web-based survey aided in computing a score for each credit union's IT risk management initiative measured using the risk IT framework. Secondary data, obtainable from independent audited financial statements, provided data for institution size measured by asset in dollars, and financial performance measured by the credit unions' ROA. Figure 2 provides a graphical overview of the process flow for data collection and analysis for this study.

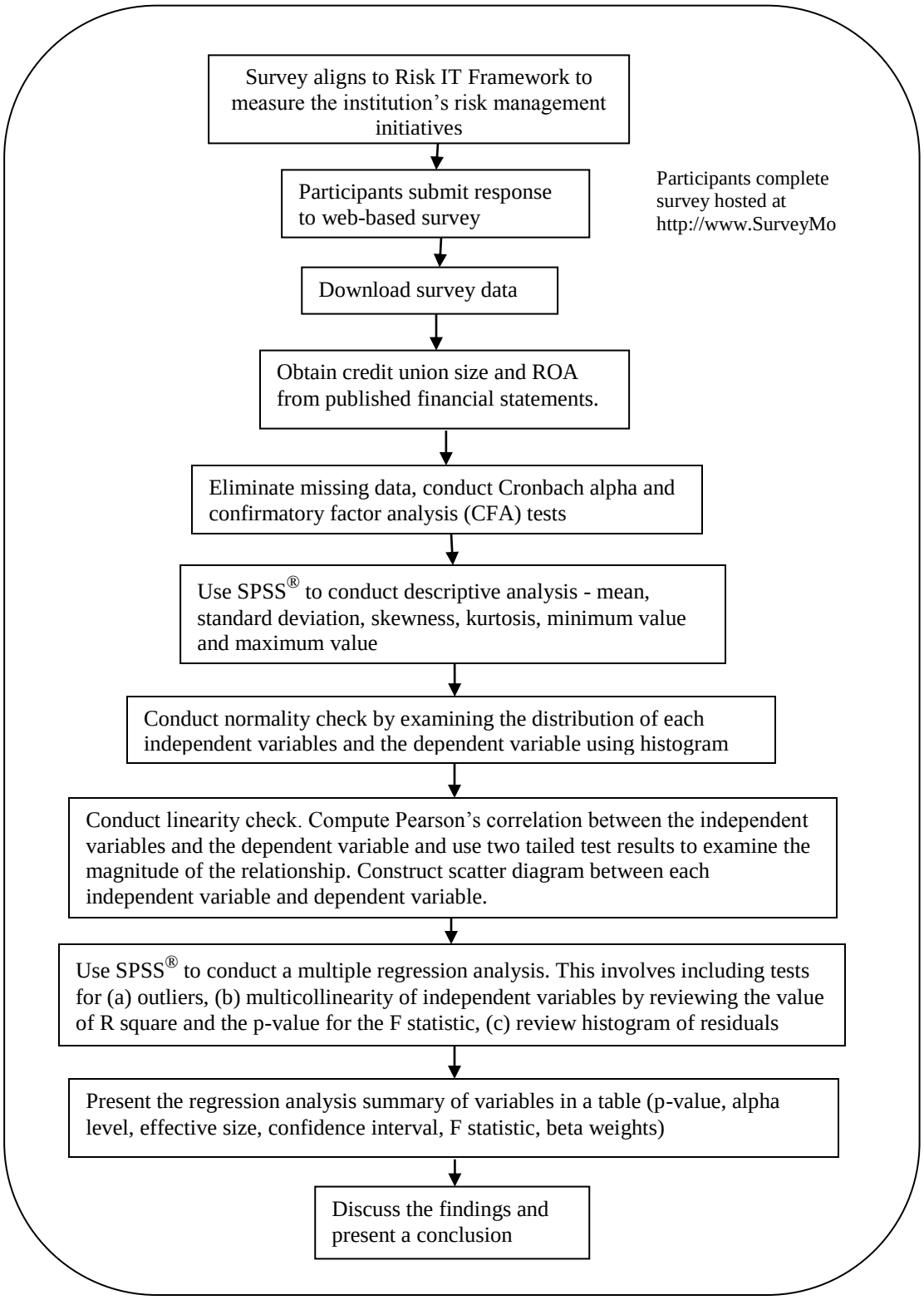


Figure 2. Process flow for data collection and analysis.

Instruments

The risk IT framework, one of two volumes of the risk IT model, was the instrument used to assess the Jamaican credit unions' IT risk management initiatives. According to ISACA (2012), the risk IT framework addresses the key constructs of the risk IT model -- risk governance, risk evaluation, and risk response. Further, the risk IT framework fosters the measurement of an institution's IT risk management initiatives using computed scores for each high-level objective specified in the framework (Bashki, 2012). During the 2008 and 2009, ISACA working groups consisting of 112 members from 18 countries and over 1700 other IT professionals developed the risk IT framework and its scoring model (ISACA, 2012). Modification to the instrument for this study was unnecessary because the primary objective of the instrument was to measure the credit unions' risk management initiatives. Researchers such as Bashki, Svatá (2013), and Svatá and Fleischmann (2011) argued that the risk IT framework is appropriate to measure an institution's IT risk management initiatives. However, the absence of a quantitative research using the risk IT framework required that I conduct a Cronbach's alpha test to verify the reliability of the instrument and a CFA test to ascertain the validity of the instrument.

The risk IT framework consists of process areas further sub-divided into high-level objectives. The process areas for risk governance include (a) alignment between an enterprise risk management activities and IT-related activities; (b) enterprise risk management system, which incorporates IT risk management; and (c) enterprise decisions, which incorporate IT opportunities and consequences (ISACA, 2012). Equally,

the process areas for risk evaluation include (a) IT risk identification system, (b) the use of data to support risk decisions, and (c) IT risk inventory (ISACA, 2012). Risk response process areas involve (a) ensuring that relevant personnel is aware of IT-related exposures and opportunities, (b) measuring and reducing IT risk from identified strategic opportunities, and (c) developing strategies for limiting loss from IT-related events (ISACA, 2012). Appendix E contains the list of key constructs, process areas, and high-level objectives.

A web-based survey was the chosen medium to collect data for the ordinal variable, IT risk management. Costa e Silva and Duarte (2014) contended that researchers are increasingly using web-based surveys to collect data. Lee and Oh (2013) conducted a quantitative study on whether Twitter uses enhanced individuals' news knowledge. Using a sample size of 306 participants, Lee and Oh concluded that Twitter users attuned to current affairs were more likely to acquire hard news using Twitter. Similarly, Monteiro, Wilson, and Beyer (2013) used a web-based survey to collect data for their research. Monteiro et al. studied the attributes colleague professors place on the cause of teaching effectiveness and success. Monteiro et al. analyzed data from 181 respondents and suggested non-tenured professors and tenured professors had different casual attributes for their teaching effectiveness and success.

I shared the website address for the web-based survey to each participant via an email from my Walden University email address after receiving Walden University IRB approval to conduct the study (IRB 11-05-15-0291900). The web-based survey contained four sections, of which the latter three sections corresponded to the aforementioned key

constructs. The first section of the survey required each participant to confirm the respondent's age of 18 years or older, the position of the participant at the credit union, and the institution size, measured by asset in dollars. The second section of the web-based questionnaire contained 16 questions on risk governance initiatives at each credit union. There were 14 questions on risk evaluation initiatives and the final 13 questions related to the credit union's risk response efforts. The estimated time required to complete the web-based survey was 20 minutes. The design of the electronic survey involved not allowing respondents to enter the survey after clicking the done button.

To compute a final grade for an institution's risk management initiatives using the risk IT framework, I used ISACA scoring model. Using this scoring model, the score for each key construct was obtainable by calculating the average score for each process areas (ISACA, 2012). The score for each process area was attainable by computing the average of the high-level objectives scores (ISACA, 2012). ISACA provided a grading process for each high-level objective. The score for each high-level objective ranges from 0 to 5 with 0 being the lowest score and 5 being the highest score (ISACA, 2012). Table 2 depicts the possible grade for each high-level objective.

Table 2

Score for IT Risk Management High-Level Objectives

Ranking	Meaning
0	Processes are non-existent when The enterprise does not recognize the need to consider the business impact of IT risk. There is no awareness of external requirements for IT risk management and integration with enterprise risk management.
1	Processes are at an initial stage when There is an emerging understanding that IT risk is important, and management of these risks is essential but viewed as a technical issue. The business primarily considers the downside of IT risk.
2	Processes are repeatable when There is an awareness of the need to manage IT risk actively, but the focus is on technical compliance. There are emerging leaders for IT risk management within silos who assume responsibility and accountability, but there may not be any formal agreement. Risk tolerance is within these silos.
3	Processes are defined when IT risk management is a business issue. There is a designated leader for IT risk across the enterprise. The business understands how IT fits into the enterprise risk universe and the risk portfolio view. Enterprise risk tolerance germinates from local tolerances and IT risk management activities align across the enterprise. Formal risk categories are present and described in clear terms.
4	Processes are managed when IT risk management is a business enabler. The designated leader for IT risk across the enterprise engages fully with the enterprise risk committee, which expects value from including IT in decisions. The board defines risk appetite and tolerance across the risk universe, including IT risk. Enterprise policies and standards reflect business risk tolerance.
5	Processes are optimized when Senior executives make a point of considering all aspects of IT risk in their decisions. Strategic objectives arise from an executive-level understanding of IT-related business threats, risk scenarios, and competitive opportunities. Enterprise policies and standards continue to reflect business risk tolerance while increasing efficiency.

Note. Retrieved from ISACA. Copyright 2012 by ISACA. Reprinted with permission. Appendix D contains the permission to use the risk IT framework.

ISACA (2012) provided an enterprise scoring mechanism for an institution's risk management initiatives. The score for an institution's risk management initiatives otherwise named IT risk management maturity level ranges from 0 to 5. The highest score is 5, and the lowest score is 0. The score for the independent variable institution's risk management effort is obtainable by calculating the average of the scores obtained for risk governance, risk evaluation, and risk response. The institution's grading mechanism provided by ISACA assisted in assessing the effectiveness of each credit union's risk management effort. Averaging of scores to produce a final score is not a new phenomenon in research (Pretorius, Steyn, & Jordan, 2012; Serek, 2013). In their study of the IT process and governance using the COBIT framework, Debreceny and Gray (2013) ranked institutions based on a computed score. Debreceny and Gray obtained a final score by calculating the average score for each subdomain in their study. Serek computed the employee satisfaction index by averaging employee ratings on each question. Table 1 depicts the scoring grade and meaning attainable for an institution using the risk IT framework.

Independent audited credit unions' financial statements provided data for the ordinal variable institution size for each credit union. The asset size was the proxy for the size of the credit unions. Jamaica Cooperative Credit Union League (JCCUL) uses asset sizes to organize credit unions in groups. I also used this classification for credit unions in this study. JCCUL classifies credit unions size in one of four groups: (a) less than $300 million dollars, (b) greater than $300 million dollars but less than $1 billion dollars, (c) $1 billion dollars to $2 billion dollars, and (d) greater than $2 billion dollars (JCCUL,

2014). Similarly, published audited credit unions' financial statements provided data for the ratio variable ROA. ROA is each credit union's net income divided by the total assets. The average ROA for the 3 year period (2012 – 2014) was the sum of the ROA for each credit union's ROA divided by three. Table 3 depicts the operational and conceptual definition of the research variables in this study.

Table 3

Definition of Study Variables

Variable Name	Conceptual Definition	Operational Definition
IT risk management (Independent Variable)	Jamaican credit unions' IT risk management initiatives	Obtained from responses to the web-based survey. ISACA's maturity model uses the scale of 0 to 5 to measure an institution's IT risk management initiatives (ordinal variable)
Credit union size (Independent Variable)	Jamaican credit unions' asset measured by assets in dollars is obtainable from independent audited financial statements. JCCUL grouping of credit unions size will rank the size of each credit union.	Obtained in each case by assessing the asset for each credit union (ordinal variable)
Financial Performance (Dependent Variable)	Jamaican credit unions' financial performance obtained from independent audits financial statements	Obtained in each case by assessing the ROA for each credit union. ROA = Net Profit /Total Asset (ratio variable)

Reliability and validity of a research instrument are important (Chen, Lu, Chau, & Gupta, 2014; Costa, Bandeira, & Nardi, 2013; Oei, Sawang, Goh, & Mukhtar, 2013). Costa et al., suggested that there are advantages and disadvantages for scale developers to create a new valid and reliable instrument rather than adopt a pre-existing instrument. An

advantage of developing a new research instrument is that researchers can include new questions that do not appear in an existing scale (Costa et al., 2013). However, a disadvantage of creating a new instrument is the risk of the scale not being used by other researchers (Costa et al., 2013).

Chen, Lu, Chau, and Gupta (2014) developed a measurement model to assess the behaviour of users on social networking sites. To validate the model, Chen et al. analyzed data from 477 social networking site users using web-based survey and reviewed the Cronbach's alpha value, which was 0.8. The research instrument used by Chen et al. (2014) to measure the behaviour of active social networking site users was reliable and valid.

Researchers such as Oei, Sawang, Goh, and Mukhtar (2013) reviewed the value for Cronbach's alpha to assess the reliability of the research instrument. According to Oei et al., Depression Anxiety Stress Scale 21 (DASS-21) was reliable and valid for studies including Hispanic American, British, and Australian adults. Oei et al. studied Asians and concluded that the Depression Anxiety Stress Scale 18 (DASS-18) was valid and reliable for this population. The DASS-21 was not an appropriate instrument for Asians (Oei et al., 2013).

I used IBM SPSS Amos Version 22® (Amos) to test validity of the risk IT framework. Amos® is a statistical software that can enable a researcher to conduct a CFA test (Jain & Raj, 2013). Researchers such as Choi et al. (2015), Feldt (2014), and Roy, et al. (2013) used Amos® software to undertake a CFA test. Feldt used a sample size of 388 to test the validity of the research instrument using the Amos® software. Choi et al., Jain

and Raj, and Toman conducted a CFA test to confirm or reject the validity of the research instruments.

A CFA test is a multivariate statistical procedure used to test how the measured variables represent the number of constructs (Toman, 2014; Veale, 2014). The assumptions of CFA are (a) multivariate normality exist, (b) sample is randomly selected, (c) sufficient sample size exists, and (d) correct priori model specification exists (Choi, et al., 2015; Feldt, 2014; Roy, Vyas, & Jain, 2013; Shan, Hu, Wang, & Liu, 2014, Williams & Brown, 2013). Toman suggested that a CFA test was essential to test whether an instrument achieves a reasonable fit to the data. Veale also suggested that a CFA test was appropriate to test the appropriateness of an instrument for the data.

Roy et al. (2013) conducted a CFA test on the data using the Amos® software to check the validity of the research instrument. Using a sample of 132 participants, Roy et al. reviewed the values for Chi-square goodness fit statistic, root mean square error of approximation (RMSEA), the comparative fit index (CFI), the Tucker-Lewis fit index (TLI), and the root mean square (RMR). According to Roy et al., values obtained for chi-square goodness fit statistic, RMSEA, CFI, TLI, and RMR were greater than the assessment standard for the respective index.

Researchers such as Choi et al. (2015) undertook a CFA test to verify the validity of their research instrument using the Amos® software. Choi et al. used a sample size of 150 patients and reviewed values for RMSEA, CFI, TLI and Normal Fit Index (NFI). Choi et al. concluded that the research instrument, the Korean version of the short-form McGill pain questionnaire, was valid.

Using a sample of 388, Feldt (2014) conducted a CFA test in Amos® to verify the validity of the NEO-FFI research instrument. Feldt reviewed values RMSEA and CFI. According to Shan, Hu, Wang, and Liu (2014), the assessment standard for RMSEA is less than 0.08, and CFI is greater than 0.9. The fitting situation of the research instrument, a model of antecedent variables of dual commitment, is ideal if the assessment standards are present (Shan et al., 2014).

The content validity of the high-level objectives of the risk IT framework exists. According to ISACA (2012), between 2008 and 2009 seven IT Risk Task Force, six development team members, 65 expert reviewers, 11 Framework Committee members, and 14 Board Members developed the risk IT framework. A Microsoft Excel ® file contained the data collected from the web-based survey, asset, and each credit union's ROA. Participants can receive a copy of the completed study upon request from the researcher. Appendix D displays the permission from ISACA to use the risk IT framework in this research.

I used SPSS® reliability statistics feature to compute Cronbach's alpha value and assess the reliability of the instrument. Chewaskulyong et al. (2012) focused on establishing reliability in research because of its critical role in a study. Maria, Fibriani, and Sinatra (2012) argued that Cronbach's alpha value greater than 0.6 confirmed the reliability of their research instrument. Yesil (2012) used Cronbach's alpha test to validate the internal consistency of the study.

Data Collection Technique

The central research question that guided the study was the following: What is the relationship between IT risk management measured using web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica? Participants undertook a self-administered electronic survey using SurveyMonkey®. According to Cardamone et al. (2014), web-based surveys foster reliable data collection. These surveys foster (a) decreased research costs, (b) faster response times in collecting data, and (c) efficiency of data collection (Albaum, Roster, & Smith, 2012; Bakla, Cekic, & Kosksai, 2013). However, there are disadvantages with web-based surveys (Reitz & Anderson, 2013). According to Reitz and Anderson, the inability of a respondent to save and return to the survey at a later date is a disadvantage of a web-based survey. Reitz and Anderson reviewed survey methods used with the nurse workforce. Halbesleben and Whitman (2013) suggested nonresponse bias is a disadvantage of a survey. Despite the disadvantages of web-based surveys, Li et al. (2012) collected data using web-based surveys from 840 respondents in the United States, Palau, and Virgin Islands. The survey data combined with the data on credit unions' sizes and financial performances answered the primary research question for my study. I analyzed only complete surveys. Appendix C contains a list of survey questions.

SurveyMonkey® is an appropriate web-based survey tool. SurveyMonkey® has many features that enables a researcher to (a) create user-friendly survey screens, (b) direct the flow of the survey, and (c) create surveys in a private and secure environment because the site has secure socket layer encryption [SSL] (SurveyMonkey, 2015). In my

survey, the features of the electronic survey included (a) providing guidelines for taking the survey, (b) the ability of respondents to traverse the previous page or edit a response while taking the survey, (c) preventing respondents from reentering the survey after clicking the done button, and (d) adding a *Thank You* page to signal the completion of the survey. Robu (2015) used SurveyMonkey® to analyze financial statements of companies in Romania that adopted International Reporting Financial Standards (IFRS). Croke et al. (2012) also used SurveyMonkey® to collect data for their study in continuity clinics in Canada. Participants accessed the online survey after agreeing to the terms of the survey.

Maintaining participants' privacy in my research was critical and consistent with activities undertaken by other researchers such as Humayun et al. (2014), McAdams, Erdenebileg, Batra, and Gerelmaa, (2012) and Shidhaye, Divekar, Goel, and Rahul (2011). I maintained participants' privacy by using SurveyMonkey® unique identifier (a 10 digit unique number), which sequentially numbered each participant. Humayun et al. maintained participants' privacy by excluding the respondents' names and giving a unique identification number (a 9 digit unique number) to each respondent.

Survey questions, 4 through 45, had six possible answers. I imported the survey responses into IBM SPSS Amos Version 22® (Amos), IBM SPSS Statistics Version 21 ® (SPSS), and Microsoft Excel® (Excel). Amos® was the chosen software to conduct the CFA test and create the path diagram of structural equation modeling (SEM) for CFA. SPSS® was the selected data analysis tool for descriptive statistics, checks for normality, linearity, multicollinearity, residuals, outliers, homoscedasticity, and multiple regression tests. I used SPSS® to generate data outputs in scatter plots, histograms, and tables.

Researchers such as Li (2014), Wang, Qu, and Yuan (2014), and Wang and Wang (2014) used SPSS® to output their study results. I stored the Microsoft Excel® file that contained the raw data for my study on a USB drive in a locked drawer at my residence. After completing the study, the research data will reside on a USB drive in a safety deposit box at a financial institution for 5 years.

The absence of quantitative research using the risk IT framework in prior studies resulted in the need to test the validity and reliability of the research instrument. I used SPSS® software to perform the Cronbach's alpha test for reliability. Cronbach's alpha test is an appropriate test for reliability of an instrument (Agha, Alrubaiee, & Jamhour, 2012; Akpinar & Küçükgüçlü, 2012; Maria et al., 2012; Oliveira, Fernandes, & Sisto, 2014; Tan, Benbasat, & Cenfetelli, 2013). Test results greater than 0.7 using a Cronbach's alpha test indicates that a research instrument is reliable (Beser, Küçükgüçlü, Bahar, & Akpinar, 2012). However, Maria et al. suggested that Cronbach's test results of values greater than 0.6 also confirms the reliability of an instrument. I conducted a Cronbach's alpha test to test the reliability of the risk IT framework.

Feldt et al. (2014) suggested a CFA test is an appropriate validity test for a research instrument. Therefore, I performed a CFA test using the Amos® software. CFA test is one of two-factor analysis testing techniques. Exploratory factor analysis test (EFA) is the other factor analysis testing procedure.

According to Toman (2014), a factor analysis is a technique that seeks to explain the relationship between the observed variables and their latent factors. Toman argued the goal of EFA is to test whether the factors are sufficient to explain the observed variables.

Researchers such as Lundqvist (2014) and Kim and Seo (2015) also conducted EFA tests to test the instruments' validity. According to Lundqvist, an EFA test aids in identifying the factor structure of the research variable. Kim and Seo (2015) argued that one of the assumption of an EFA test is that one or more latent variables exert a causal influence on the variable and results in the observed variance.

Conducting EFA and CFA tests are necessary when developing and validating a research instrument (Agariya & Yayi, 2015; Demo, Neiva, & Rozzett, 2012; Wilson & Holmvall, 2013). Agariya and Yayi developed an employee relationship management (ERM) diagnostic scale to assess the Indian IT sector. According to Agariya and Yayi, employees in India are important in enabling India to contribute to the development of Asia as the world's economic leader. Therefore, a diagnostic scale is necessary to assess the psychological health of the employees. After conducting EFA and CFA tests, Agariya and Yayi concluded that the instrument was valid.

Demo et al. (2012) also conducted EFA and CFA tests in their quantitative study. Demo et al. developed the Human Resource Management Policy and Practice Scale (HRMPPS). According to Demo et al., there was a lack of a scientific instrument to measure employees' perceptions of policies and practices in an organization. Demo et al. established the validity of the instrument by performing EFA and CFA tests. After analyzing data from 632, Demo et al. concluded that the instrument was a good fit for the data.

Wilson and Holmvall (2013) also conducted EFA and CFA validity tests in their study on incivility from customers in organizations. Wilson and Holmvall developed the Incivility from Customers Scale to assess the nature and effects of customer incivility in

workplaces. The sample size was 439 participants. Using results from EFA and CFA tests, Wilson and Holmvall concluded that the scale was unidimensional and valid.

The risk IT framework is an established instrument to measure an institution's IT risk management initiatives (Bashki, 2012; ISACA, 2012; Svatá, 2013). The risk IT framework was not modified in this study, and therefore conducting an EFA test was unnecessary. Similar to Nel, Plesis, and Bosman (2015), Monzani et al. (2015), and Veale (2014), I conducted a CFA to determine whether the research instrument is a good fit for the data. I reviewed values for the normal fit index (NFI); the incremental fit index (IFI), Tucker-Lewis index (TLI), comparative fit index (CFI), and the root mean square error of approximation (RMSEA).

Nel, Plesis, and Bosman (2015) conducted a CFA test using an existing instrument. According to Nel et al., the purpose of their study was to investigate whether the 20 item version, 30 item version, or the 40 item version of the Rahim EQI instrument was appropriate for conducting research within South African organizations. After analyzing the data from their research, Nel et al. concluded on the appropriateness of the instrument for their target population in South Africa.

Monzani et al. (2015) conducted a CFA test to investigate the appropriateness of using the Brief COPE instrument to assess coping responses to specific events. According to Monzani et al., the Brief COPE measured 14 coping responses and had fewer items than the COPE instrument. Monzani et al. used a convenience sample of 606 participants. Monzani et al. (2015) concluded that the Brief COPE instrument was valid and reliable to evaluate coping responses to specific events.

Veale (2014) conducted a CFA test to determine whether the 10-item, 7-item or the 4-item Edinburgh Handedness Inventory scale was appropriate to measure handedness. Veale suggested a CFA test was necessary to assess the factorial validity of questionnaires. Veale concluded the 4-item Edinburgh Handedness Inventory scale was a good model fit with variables that are both continuous and ordinal.

Data Analysis

The central research question that guided the study was the following: What is the relationship between IT risk management measured using web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica? The following null and alternative hypotheses relate to the research question:

Null hypothesis (H_0): There is no statistically significant relationship between IT risk management measured using a web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica.

Alternative hypothesis (H_1): There is a statistically significant relationship between IT risk management measured using a web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica.

Table 4 displays the data analysis plan for this study.

Table 4

Data Analysis Plan

Research Question	Theoretical Framework	Hypothesis	Variables, Instrument, Scale of measurement	Descriptive Statistics	Statistical Test	Assumption	Testing	Inferential Results
What is the relationship between IT risk management measured using web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica?	Risk IT Framework	H_0 There is no statistically significant relationship between IT risk management measured using web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica H_1 There is a statistically significant relationship between IT risk management measured using web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica	Independent: IT risk management (A), web-based survey, Ordinal variable Independent: Institution Size (B), asset in dollars, Ordinal variable Dependent: Financial performance (C), ROA, Ratio variable	Quantitative variables - Mean, Standard Deviation, Minimum, Maximum, Variance, Skewness, Kurtosis	Pearson correlation tests, Standard multiple regression tests	Normality Linearity Multicollinearity Residuals Outliers Homoscedasticity	Histograms Scatterplot Normal probability plot of the Regression Standardized Residual value ‘‘ ‘‘ ‘‘ ‘‘	Alpha level, p-value, effect size (R2) Confidence intervals, Degree of Freedom (df) F statistic, Beta weights

Validity. Using the Amos® software I conducted a CFA test to assess the validity of my instrument. According to Williams and Brown (2013), the Amos® software enables a researcher to conduct a model fit during a CFA. Researchers such as Choi et al. (2015) and Roy et al. (2013) also used the Amos® software to perform a model fit during a CFA. Williams and Brown suggested that an initial measurement model using Amos® is necessary after removing responses with missing data. The measurement model graphically displays the relationship between the latent variables and the items (Roy et al., 2013). The output selected for my model was minimization history, standardized estimates, residual moments, and modification indices. Jain and Raj (2013) suggested no single measure for testing model fit exists, and therefore consideration of several measures together were necessary to reach a conclusion. I assessed the values for RMSEA, IFI, NFI, TLI, and CFI. According to Feldt (2014), Iani, Barbaranelli, and Lombardo (2015), and Nel et al. (2015), RMSEA represents the variation between the model covariance matrix and the population covariance matrix. CFI measures the improvement of the overall fit of the model (Iani et al., 2015; Wu & Cheung, 2014). NFI represents the comparison of the x^2 value of the model to the x^2 value of the null model, and the TLI is the adjusted NFI for the number of degrees of freedom in the model (Jain & Raj, 2013). Shan, Hu, Wang, and Liu (2014) argued the assessment standard for RMSEA is less than 0.8, and CFI is greater than 0.9. Choi et al. (2015) and Jain and Raj (2013) also suggested that a good fit is present if the value for RMSEA is less than 0.8. Feldt (2014) and Jain and Raj argued that a mediocre fit exists if the value for RMSEA is greater than 0.8 but less than 0.1. According to Jain and Raj, the values for IFI, NFI, TLI

and CFI should range from 0 to 1 and values greater than 0.9 indicates that the instrument is a good measure for the data. An initial measurement model and a follow-up analysis were necessary for my study. The follow up analysis involved relaxing the constraints one at a time beginning with the parameter with the largest modification index value until no significant change was present.

Reliability. The data analysis process involved understanding and interpreting the collected data. The study required tests for reliability and validity of the research instrument before undertaking the multiple regression tests. I used Cronbach's alpha test to verify the reliability of the instrument (Oei, Sawang, Goh, & Mukhtar, 2013). The values for Cronbach alpha test was greater than 0.7, and therefore the instrument is reliable.

Multiple regression. Following the tests for reliability and validity, I performed the standard multiple regression tests because of the research question, the number of research variables, and the scale of measurement of the research variables. Statistical tests such as correlation test and path analysis were inappropriate for this study. A correlation analysis involves examining the relationship between two variables (Dong, Ding, & Chen, 2012; Pardamean, Suparyanto, & Kuriawan, 2013; Taylor & Bates, 2013). My study involved three variables. A path analysis involves examining the direct and indirect effects of the independent variables (Temel, 2013; Ye, Yao, Liu, Fan, Xu, & Chen, 2014). My study did not include an evaluation of the effects of the independent variables.

There are three types of multiple regression tests: (a) standard, (b) hierarchical, and (c) stepwise (Elzamly & Hussin, 2014; Huihua, Youpeng, Longfei, & Feng, 2015;

Mohapatra & Das, 2013). A standard multiple regression analysis involves the examination of the relationship between two or more independent variables and a dependent variable (Collard, Ruttle, Buchanan, & O'Brien, 2013; Elzamly & Hussin, 2014; Mohapatra & Das, 2013). This test was appropriate for this study because it involved the examination of the relationship between two independent variables and one dependent variable. Both hierarchical multiple regression and stepwise multiple regression tests were inappropriate multiple regression tests for this study. Hierarchical multiple regression analysis involves the examination of the relationship between a set of independent variables and a dependent variable after controlling the effect of other independent variables on the dependent variable (Feldt et al., 2014; Martinez & Scott, 2014; Newton & Teo, 2014). Stepwise multiple regression tests involve the identification of a subset of independent variables that has the strongest relationship to a dependent variable (Elzamly & Hussin, 2014; Huihua et al., 2015; Pang et al., 2012).

The data analysis process in this study involved a review of completed electronic surveys from eligible participants. Missing data in electronic surveys is inevitable (Roda, Nicholas, Momas, & Guihenneuc, 2014), and hence the data analysis process excluded these missing or incomplete electronic surveys. The results from the analyzed data assisted in accepting or rejecting the aforementioned null hypothesis. Equally, results from the analyzed data assisted in determining whether the standard multiple regression equation ($Y=a + b_1X_1 + b_2X_2$) was applicable.

Standard multiple regression analysis relies on assumptions about a study's variables. The assumptions evaluated during the data analysis phase include normality,

linearity, multicollinearity, residuals, outliers, and homoscedasticity. These regression assumptions are consistent with the multiple regression assumptions suggested by Dumitrescu, Stanciu, Tichindelean, and Vinerean (2012). The assumption of normality is that there is a normal distribution of variables (Trawinski, Smetek, Telec, & Lasota, 2012). The assumption of linearity is that there is a linear relationship between the research variables (Dumitrescu et al., 2012). Equally, the assumption of multicollinearity is that there is a correlation between two or more independent variables (Baciu & Parpucea, 2013; Midi & Arezoo, 2013; Zainodin & Yap, 2013). However, the assumption of multiple regression is that collinearity among independent variables does not exist (Zainodin & Yap, 2013). The assumption of homoscedasticity is that a relationship between the each of the independent variables with the dependent variable exists (Arendacká, 2012; Vindras, Desmurget, & Baraduc, 2012). I evaluated the existence of multicollinearity by viewing the correlation coefficients among the predictor variables. I also evaluated outliers, normality, linearity, homoscedasticity, and residuals by examining the normal probability plot of the regression standardized residual, histogram, and the scatter plot of the standardized residuals. Violations of the multiple linear regression assumptions would require activities including (a) using a different linear model; (b) performing transformations to correct nonnormality, nonlinearity and multicollinearity; (c) removing outliers; and (d) using weighted linear regression model (Hassan, Farhan, Mangayil, Huttenen, & Aho, 2013; Zainodin & Yap,2013).

SPSS® was the primary statistical tool used to conduct a descriptive analysis and multiple regression tests. Quantitative researchers such as Ajiboye, Ajiboye, and

Omozokpia (2013), Motamedi Joybari, Gholipour, and Yazdani Charati (2013), and Wang and Wang (2014) used SPSS® statistical software for data analysis. I generated descriptive statistics in SPSS® on the data collected. Researchers such as Lira, Ripoll, Peiro, and Zornoza (2013), and Otte, Bngerter, Britsch, and Wuthrich (2014) used descriptive statistics in their quantitative studies. Descriptive statistics in SPSS® provided results for central tendency (mean), and dispersion (range, standard deviation, variance, minimum, and maximum). I outputted the data generated from the descriptive statistics in a table and included in Section 3.

I created the correlation matrix using SPSS®. The correlation matrix result provided values for Pearson's correlation and two-tailed test. Pearson correlation coefficient (r) represents the linear relationship between variables (Dong, Ding, & Chen, 2012; Gardner & Neufeld, 2013; Taylor & Bates, 2013). A value of +1 represents a perfect positive relationship between the dependent and independent variables, and a value of -1 represents a perfect negative correlation between the dependent and independent variables. A two-tailed test indicated the significance of the correlation between the variables (Darvish & Temelie, 2014; Pitman, 2013; Tisone et al., 2014). I accepted the alternative hypothesis and rejected the null hypothesis (if $\rho < \alpha$) because the significance value of the normality test was smaller than 0.05. Figure 3 depicts the sampling distribution model used in a two-tailed test.

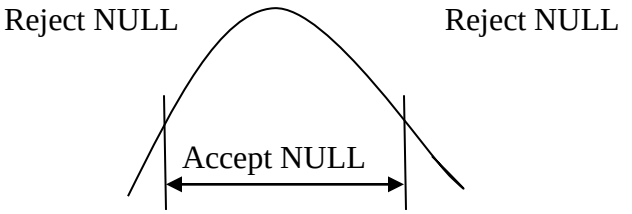


Figure 3. Two-tailed test distribution model.

I generated a scatter plot of the dependent variable with each independent variable. There were no violations of normality. Features selected in SPSS® to conduct the multiple regression analysis included linear regression, estimates, model fit, and collinearity diagnostics. Collinearity diagnostics assisted in checking for multicollinearity. I checked for residuals using a histogram. The histogram displayed the distribution of the residuals. Outliers test involved reviewing of unusual data patterns from a random sample of a population (Astill, Harvey, & Taylor, 2013; Ghapor, Zubairi, Mamum, & Imon, 2014; Koch, 2013). Ghapor et al. recommended a bootstrapping testing procedure to test for outliers. A bootstrapping test was necessary to test the influence of assumption violations. The multiple regression tests also involved testing for homoscedasticity. Section 3 contains the output for multicollinearity, violation of normality assumptions, and outliers. This output provides the overall model and the ANOVA results.

Appendix F contains the SPSS® output which displays values for R, R-square, adjusted R-square, and the standard error of the estimation. The R-square value provides an explanation of the variation in the dependent variable as a result of the independent variables (Quinino, Reis, & Bessegato, 2013). The p-value for F statistic aids in determining whether one or both independent variables is a significant predictor of the

dependent variable (Chandrakantha, 2015; Mishra, 2016; Pal & Bhattacharya, 2013). The prediction for the dependent variable (financial performance of institution) based on the two independent variables (IT risk management and institution size) expressed in an equation is $Y=a + b_1X_1 + b_2X_2$. Table 5 depicts the multiple regression equation variables and meaning.

Table 5

Multiple Regression Equation Variables and Meaning

Variable	Meaning
Y	The value of the predicted dependent variable (Y).
a	The constant or intercept (alpha).
b_1	The slope (beta coefficient) for X_1
X_1	The first independent variable that is explaining the variance in Y.
b_2	The slope (beta coefficient) for X_2.
X_2	The second independent variable that is explaining the variance in Y.
s.e.b_1	The standard error of coefficient b_1.
s.e.b_2	The standard error of coefficient b_2
R^2	The proportion of the variance in the values of the dependent variable (Y) explained by all the independent variables (Xs) in the equation together.
F	Whether the equation as a whole is statistically significant in explaining Y.

Using the model summary, ANOVA, and coefficient output tables from SPSS®, I evaluated the values of p, R^2, and F. The model summary table provided the value for R^2 that indicated the total variation in the dependent variable. The p-value from the ANOVA output table aided in determining whether IT risk management and institution size were

significant predictors of the financial performance of credit unions in Jamaica. The p-value for the study model was less than 0.05. Combined, IT risk management and institution size can significantly predict the dependent variable (financial performance). The ANOVA table found in Appendix F also displays the values of the regression model and residuals.

The coefficient output table aided in determining whether each independent variable is a predictor of the dependent variable (Pal & Bhattacharya, 2013). The p-value for institution size was below 0.05 and indicated that the institution size is a significant predictor of financial performance. The p-value for IT risk management was greater than 0.05 and indicated that the IT risk management initiative of the credit union is not a significant predictor of financial performance. The coefficient table displays the collinearity statistics.

Appendix F contains the output for the bootstrap test. A bootstrap test is a test for outliers (Ghapor et al., 2014; Mandy, Roughan, & Skuse, 2014; Tchatoka, 2015). The bootstrap for coefficient output table provided information on any violation of assumptions. The bootstrap for coefficients table (see Appendix F) displays the 95% confidence interval lower and upper limits of each independent variable: IT risk management and institution size. The p-value for institution size was lower than 0.05, and therefore institution size is a significant predictor of the model.

Study Validity

The ultimate goal of a study is to produce reliable knowledge, and hence establishing the validity of research is essential. Maddux and Johnson (2012) suggested

that validity is critical for all research methodologies -- qualitative, quantitative, and mixed-methods. There are two generic types of validity in a quantitative study: internal and external validity. Internal validity is relevant to establish a causal relationship (Aguinis & Edwards, 2014; Neall & Tuckey, 2014; Pirog, 2014). This study sought to examine whether a relationship existed between the independent and dependent variables, and therefore I did not expect threats to internal validity in this study.

External validity refers to the ability of a researcher to make reliable inferences about a topic beyond that of its current context (Lancsar & Swait, 2014). Researchers should evaluate whether the results apply to other population, time, and places (Delen et al., 2013). Maddux and Johnson (2012) argued that the participants in a study must be similar to the entire population to generalize a study's results. Bevan, Baumgartner, Johnson, and McCarthy (2013) suggested a selection bias will be the major threat to external validity if the sample of a study does not represent the target population adequately. This study included several strategies to overcome external validity. First, the use of an appropriate sample (Lancsar & Swait, 2014). Pirog (2014) argued to reduce threats to external validity random selection of the participants is necessary. Random sampling is an appropriate sampling method because self-selection of participants reduces the external validity of a study (Fernandez-Hermida, Calafat, Becona, Tsertsvadze, & Foxcroft, 2012). The computed sample for this study using G*Power was 68. In this study, I employed a sample size of 130 participants (N = 130). Random sampling of participants was unnecessary because the number of participants was below targeted sample of 150. Second, the use of a reliable and a valid instrument. The research

instrument developed by ISACA (2012) contains clearly defined categories for responses to risk governance, risk evaluation, and risk response that will not vary. Babbie (2012) argued reliability in research is the extent in which consistent results are obtainable using the research technique repeatedly. Therefore, I systematically documented the process used in this study to maintain consistency in the research approach. The appropriateness of the risk IT framework to measure IT risk management initiatives is supported by Bashki (2012). However, Bashki (2012) study involved a qualitative methodology while this study involved a quantitative methodology. Therefore, a CFA test of the research instrument with the target population aided in establishing external validity, and a Cronbach's alpha test established the reliability of the risk IT framework. Third, the focus on credit unions in Jamaica because the geographical limitation is Jamaica. Jamaican credit unions have similar characteristics to other financial institutions in Jamaica's financial industry. The results of this study might apply to other financial institutions in the Jamaican financial industry. Therefore, users of this study might apply the results to other Jamaican financial institutions. However, users should not generalize results to the overall Jamaican financial industry.

This quantitative correlation study involved a review of the relationship between three variables: IT risk management, institution size, and financial performance. Establishing statistical conclusion validity was necessary for this study. Statistical conclusion validity refers to the reasonableness of a stated conclusion about the relationship between a study's variables (Gibbs & Weightman, 2014). There are two types of error that can occur when making a conclusion (Neall, & Tuckey, 2014;

Rodriguez, 2013). They are: (a) concluding that there is no relationship between the research variables when a relationship exists, and (b) concluding that there is a relationship between the research variables when a relationship does not exist (Neall, & Tuckey, 2014; Rodriguez, 2013). The four components that influence the conclusion from a statistical test are (a) sample size, (b) effect size, (c) alpha, and (d) power (Neall & Tuckey, 2014). There are four strategies used in this study to minimize threats to statistical conclusion validity. The first strategy involved selecting an appropriate sample size, which is 150. The sample of 150 participants was larger than the computed sample using G*Power, which was 68 participants. Researchers such as Balkin and Sheperis (2011) suggested G*Power is an appropriate tool to compute the size for the sample. The use of the medium effect size, a significance level of 0.05, and a confidence interval of 80% in this study aided in minimizing threats to statistical conclusion validity. Eisend (2015) demonstrated that using a medium effect size is appropriate in quantitative research. Researchers such as Olalekan andTajudeen (2015) used a significance level of 0.05 in their quantitive study where they rejected the null hypothesis and concluded that cost control in firms aids in boosting profitability. McBride et al. (2012) used a confidence interval of 80% in their study. The second strategy included conducting a multiple regression analysis to determine whether a relationship exists between the research variables (Collard et al., 2013; Elzamly & Hussin, 2014; Mohapatra & Das, 2013). Evaluating values for F and R^2 was the third strategy to minimize threats to statistical conclusion validity, and the final strategy involved ensuring the reliability of the research technique. Tai (2015) undertook multiple regression analysis in his

quantitative study and concluded the size of the board, block shareholding, and the type of bank affected the financial performance of these banks. The F-value aids in explaining the statistical significance of the linear equation (Mishra, 2016), and R^2 value aids in explaining the variance in the values of the dependent variable explained by the two independent variables (Quinino, Reis, & Bessegato, 2013). Similar to Agha et al., I used Cronbach's alpha test to determine the reliability of the instrument.

Transition and Summary

The purpose of the study was to examine the relationship between IT risk management, institution size, and the financial performance of credit unions in Jamaica. Section 2 included a description of the participants in the study, the research method and design, and the data analysis process. All these sections tied back to the overall research questions of the study and the research hypotheses. Section 3 includes the findings of the data analysis, provides a suggestion on how the study affects the professional community and include the implications for social change.

Section 3: Application to Professional Practice and Implications for Change

Section 1 provided a foundation and background for the study, which introduced the topic and problem chosen to solve the business problem. The literature review provided an in-depth discussion of the literature addressing the business problem. In Section 2, I explained the research process to conduct a quantitative study of the relationship between IT risk management, institution size, and financial performance of credit unions in Jamaica, West Indies. In section 3, I present the findings of the study. Section 3 also includes application to professional practice, implications for social change, recommendations for actions, and recommendation for further study. Additionally, Section 3 includes reflections and a conclusion.

Introduction

A negative association between unmanaged IT risk and financial performance of institutions (Goldstein et al., 2011). The effects of unmanaged IT risk have been documented by Research Information Limited (2012); however, some institution leaders do not understand the relationship between IT risk management, institution size, and financial performance of credit unions in Jamaica. The participants for this study were employees of 13 credit unions in Jamaica. The theoretical model used in this study was the risk IT model developed by ISACA. The risk IT model contains two volumes, which include the risk IT framework (Svatá & Fleischmann, 2011). I conducted a web-based survey to obtain values for the independent variable IT risk management. Independent audited financial statements provided data for institution size and financial performance of the Jamaican credit unions.

Presentation of the Findings

In this study, I employed a quantitative correlational design with standard multiple regression analysis to examine the relationship between IT risk management, institution size, and financial performance of credit unions in Jamaica. The independent variables were IT risk management and institution size, and the dependent variable was financial performance. The study consisted of one central research question: What is the relationship between IT risk management measured using a web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica? The research data provided information to assess the research hypotheses:

Null hypothesis (H_0): There is no statistically significant relationship between IT risk management measured using a web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica.

Alternative hypothesis (H_1): There is a statistically significant relationship between IT risk management measured using a web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA in credit unions in Jamaica.

To answer the research question, I collected data using a web-based survey and reviewed independent audited financial statements of each participating credit union. The participants were employees in 13 credit unions in Jamaica in positions of executives, managers, supervisors, IT employees, risk employees, or audit employees at the time of

the survey. One hundred and thirty eligible participants received emails soliciting their participation in the study, which was below the number of 150 participants initially established for the study. The eligible participants received follow-up reminders to participate in the study over a period of 6 weeks following approval from Walden University IRB. The survey period ended after no new responses were submitted over a period of 10 days. One hundred and two responses were usable in the study. The independent audited financial statements provided data for the credit unions' size measured by asset in dollars, and the credit unions' financial performance measured by ROA.

Validity and reliability test results. Bashki (2012), Svatá, (2013), and Svatá and Fleischmann (2011) suggested the risk IT instrument is an appropriate tool to measure an institution's risk management initiatives. However, validity tests were not conducted in studies undertaken by Bashki, Svatá, and Svatá and Fleischmann. To confirm the validity of the risk IT framework to measure the credit unions' IT risk management initiatives, I used a CFA test including complete responses. I built an initial measurement model using Amos® as outlined in Section 2. The parameters selected in Amos® software were minimization history, standardized estimates, residual moments, and modification indices for the model. Modification of the CFA test was necessary and involved relaxing constraints one at a time beginning with the parameter with the largest modification index values until no significant change was present. Feldt (2014), Jain and Raj (2013), and Shan, Hu, Wang, and Liu (2014) recommended relaxing the parameters with the largest modification index values until values for normed-fit index (NFI), comparative fit index

(CFI), Tucker-Lewis index (TLI), and incremental fit index (IFI) were above 0.9. After removing 13 items from the risk governance survey questions, 11 items from the risk evaluation survey questions, and 10 items from the risk response survey questions, the values for normed-fit index (NFI), comparative fit index (CFI), Tucker-Lewis index (TLI), and incremental fit index (IFI) were above 0.95. Figure 4 depicts the path diagram of SEM for CFA, which displays the relationship between the nine measured variables and the three latent variables (risk governance, risk evaluation, risk response). Table 6 displays the model fit indices of the risk IT framework model concerning CFA.

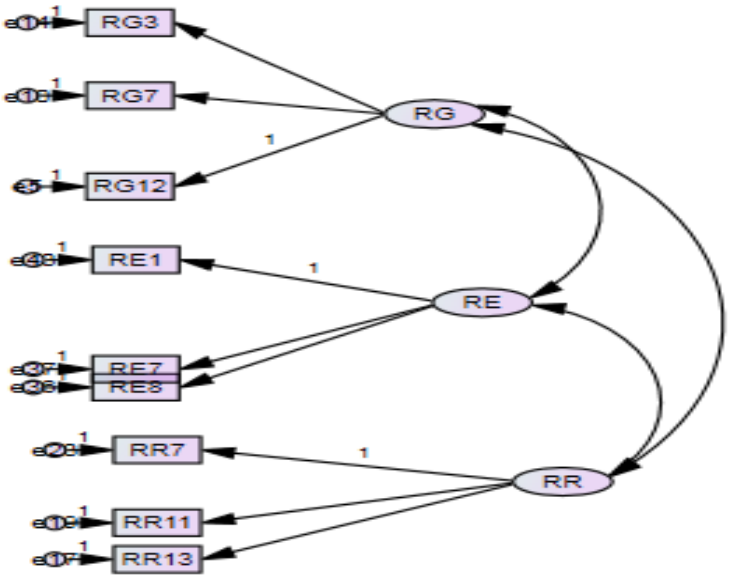


Figure 4. Path diagram of SEM for CFA.

Table 6

Model Fit Indices of the Risk IT Framework concerning CFA

Model	NFI	IFI	TLI	CFI	RMSEA
Risk IT Framework	0.960	0.970	0.955	0.970	.167

Note. N = 102; *NFI*, normal fit index; *IFI*, incremental fit index; *TLI*, Tucker-Lewis index; *CFI*, comparative fit index; *RMSEA*, root mean square error of approximation

Table 7 depicts the items contributing to the values for NFI, CFI, TLI, and IFI. The values of NFI, CFI, TLI, and IFI indicated a good model fits for nine items of the risk IT framework because these values were above the recommended value of 0.9. The risk IT framework is a valid instrument to measure credit unions' IT risk management initiatives.

Table 7

Risk IT Framework Items affecting NFI, CFI, TLI, and IFI

Risk Governance(RG)	Risk Evaluation(RE)	Risk Response(RR)
Approve IT risk tolerance threshold(RG3)	Establish and maintain a model for data collection(RE1)	Respond to risk exposure and opportunity(RR7)
Establish and manage accountability for IT risk management (RG7)	Identify IT risk response options(RE7)	Monitor IT risk (RR11)
Gain management buy-in for IT risk approach(RG12)	Perform peer review of IT risk analysis (RE8)	Communicate lesson learnt from incidents(RR13)

I performed a Cronbach's alpha test using SPSS® to test the reliability of the risk IT instrument. The value for Cronbach's alpha was 0.999. This result indicated that the

risk IT instrument was a reliable instrument to measure Jamaican credit unions IT risk management initiatives. Table 8 displays the results of the reliability test from the 43 questions in the electronic survey relating to the three key constructs of the risk IT framework.

Table 8

Reliability Statistics Using SPSS®

Cronbach alpha	Cronbach Alpha Based on Standardized Items	Number of Items
.999	.999	43

Note: $N = 43$.

Following the validity and reliability tests, I performed standard multiple regression tests, $\alpha = 0.05$ (two-tailed), to examine the efficacy of IT risk management and institution size in predicting financial performance of credit unions in Jamaica. I performed a bootstrapping test using SPSS® to test for outliers as recommended by Ghapor et al. (2014). I inputted 2000 as the bootstrap parameter to combat the possible influence of assumption violations; therefore, appropriate confidence intervals were provided. To ensure robustness of parameter estimates, Mandy et al. (2014) used bootstrap regression based on 1,000 random samples.

Descriptive statistics. I received 106 survey responses. Four records were eliminated due to missing data, resulting in 102 records used in the analysis. Table 9 presents descriptive statistics of the study variables. The mean value for financial performance of the credit unions measured using ROA was 1.6455. The average score for the credit unions' IT risk management initiative measured using web-based survey was

2.0895. The mean score for credit union size measured by asset in dollars was 2.608. Using JCCUL (2014) classification, the average asset size of credit unions ranged from $1 billion dollars to $2 billion dollars.

Table 9

Minimum (Min), Maximum (Max), Mean (M) and Standard Deviation (SD) for IT Risk Management, Institution Size and Financial Performance

Variable	*Min*	*Max*	*M*	*SD*	Bootstrap 95% CI (*M*)
Financial Performance	0	16.93	1.6455	3.0868	[1.1121, 2.2910]
IT Risk Management	0	4.77	2.0895	1.4729	[1.8030, 2.3649]
Size	0	3	2.608	0.7595	[2.461, 2.745]

Note: $N = 102$

Test of assumptions. In this section, I present results of tests of the assumptions of multicollinearity, normality, and linearity. This section also contains test resultsof the assumptions of independence of residuals and homoscedasticity. The bootstrapping test conducted in SPSS® involved a sample size of 2000 to reduce the influence of potential violations of statistical assumptions.

Multicollinearity. The assumption of multiple regression is that collinearity among independent variables does not exist (Zainodin & Yap, 2013). Baciu and Parpucea (2013) and Midi and Arezoo (2013) argued that multicollinearity exists if a correlation between two or more independent variables exists. I evaluated multicollinearity by calculating and examining the correlation coefficients collinearity statistics. The bivariate correlation between IT risk management and institution size was -0.346, indicating that

there was no violation of the assumption of multicollinearity. Table 10 displays the bivariate correlations, which were below 0.5.

Table 10

Correlation Coefficients Among Study Predictor Variables

Variable	IT Risk Management	Size
IT Risk Management	1.00	-0.346
Size	-0.346	1.00

Note: $N = 102$

Outliers, normality, linearity, homoscedasticity, and independence of residuals. Dumitrescu et al. (2012) argued that standard multiple regression analysis relies on assumptions on normality, linearity, outliers, homoscedasticity, and independence of residuals. Trawinski et al. (2012) suggested normal distribution is essential for the multiple regression tests. Tabachnick and Fidell (2013) noted study data may not follow a normal distribution. I evaluated the outliers, normality, linearity, homoscedasticity, and independence of residuals by examining the normal probability plot (P-P) of the regression standardized residual (Figure 5) and the scatterplot of the standardized residuals (Figure 6). The examinations indicated no major violations of these assumptions. The tendency of the points provided evidence that violation of the assumption of normality was not present. The lack of a clear or systematic pattern in the scatterplot of the standardized residuals (Figure 6) supported the assumptions being satisfactory. However, 2000 bootstrapping samples were computed to combat any

possible influence of assumption violations using a 95% confidence interval based upon the bootstrap samples.

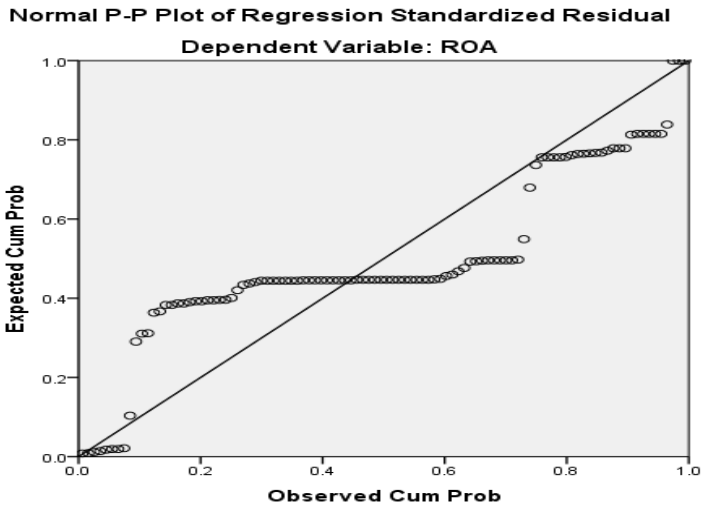


Figure 5. Normal probability plot (P-P) of the regression standardized residual

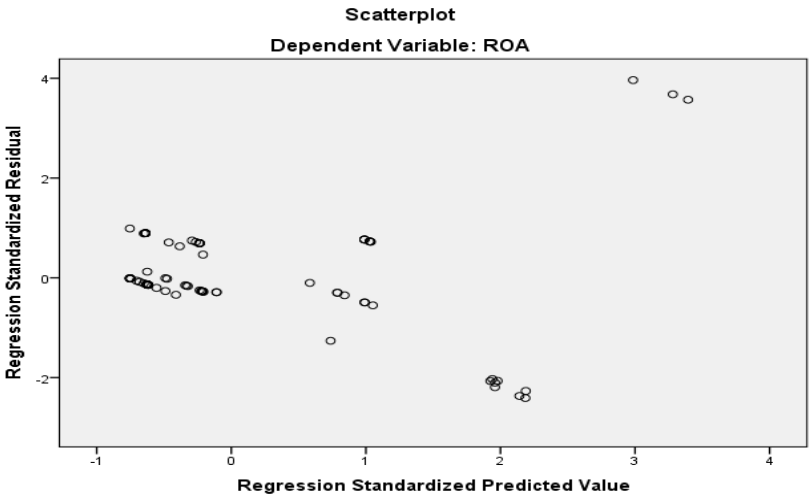


Figure 6. Scatterplot of the standardized residuals

Inferential results. Standard multiple linear regression, $\alpha = .05$ (two-tailed), was used to examine whether IT risk management activities and institution size were able to predict financial performance of credit unions in Jamaica. The independent variables

were IT risk management and institution size. The dependent variable was financial performance. The null hypothesis was IT risk management initiatives and institution size would significantly predict financial performance of Jamaican credit unions. The alternative hypothesis was IT risk management initiatives and institution size would not significantly predict financial performance of Jamaican credit unions. I conducted preliminary analysis to assess the possible existence of the assumptions of standard regression analysis, which included multicollinearity, normality, linearity, homoscedasticity, and independence of residuals. There were no violations of assumptions for the multiple regression tests. I calculated 2000 bootstrapping samples using a 95% confidence interval. The model as a whole was able to significantly predict the financial performance of Jamaican credit unions, F (2, 99) = 46.861, p = 0.000, R^2 = .486. The R^2 (.486) value indicated that approximately 48.6% of variations in financial performance accounts for by the linear combination of the predictor variables (IT risk management and institution size). I rejected the null hypothesis. In the final model, the p-value for institution size was below 0.05. Therefore, institution size was a statistically significant predictor of financial performance of Jamaican credit unions (beta = -.637, p = .000). The p-value for IT risk management was above 0.05. IT risk management did not provide any significant variation (beta = .139, p = .074) in the financial performance of credit unions in Jamaica. Appendix F contains SPSS® output for this study. The predictive equation was as follows: Financial Performance = 7.788 + 0.291 (IT risk management) -2.588 (Institution size).

Information technology risk management. The positive slope for IT risk management (.291) as a predictor of the financial performance of Jamaican credit unions indicated that there was 0.291 increase in financial performance for eachpoint increase in IT risk management. The financial performance of Jamaican credit unions increased as IT risk management increased. Table 10 displays the regression analysis value for IT risk management in predicting financial performance.

Institution size. The negative slope for institution size (-2.588) as a predictor of the financial performance of credit union in Jamaica indicated a 2.588 decrease in financial performance for each point increase in institution size. The financial performance of Jamaican credit unions decreased as institution size increased. Table 11 depicts the regression summary table, which includes the regression analysis value for institution size in predicting financial performance.

Table 11

Regression Analysis Summary For Predictor Variables

Variable	B	SE-B	β	*t*	*p*	Bootstrap 95% CI (*M*)
Constant	7.789	1.006		7.741	0.000	[1.183, 11.875]
IT Risk Management	.291	.161	.139	1.807	.074	[-0.002, .634]
Size	-2.588	.312	-6.37	- 8.30	.000	[-3.924, .433]

Analysis summary. The purpose of this study was to examine the efficacy of IT risk management and institution size in predicting the financial performance of credit unions in Jamaica. I conducted a standard multiple linear regression tests. Despite the

absence of any serious violations of the assumptions surrounding the multiple regressions analysis, I undertook a bootstrapping test using a sample of 2000 samples and a 95% confidence interval to combat any potential violations of the statistical assumption.

I performed a CFA test to verify the validity of the risk IT framework and a Cronbach's alpha test to check the reliability of the instrument. Using nine items of the risk IT framework, the values for NFI, CFI, TLI, and IFI were above 0.95, which indicated the risk IT framework was a valid instrument to measure Jamaican IT risk management initiatives. The value for Cronbach alpha value was 0.999, which indicated the risk IT framework was a reliable instrument. The findings supported the arguments by Bashki (2012), Svatá (2013) and Svatá, and Fleischmann (2011) that the risk IT framework is appropriate to measure an institution's IT risk management initiatives.

The conclusion from this analysis was that IT risk management and institution combined were able to predict the financial performance of Jamaican credit unions, F (2, 99) = 46.861, p = 0.000, R^2 = .486. Further, institution size, measured by asset in dollars, was significantly associated with the financial performance of credit unions in Jamaica. The predictive equation for this study was: Financial Performance = 7.788 + 0.291 (IT risk management) -2.588 (Institution size).

Theoretical conversation on findings. The theoretical model for this study was the risk IT model. The premise of the risk IT model was institution leaders can manage IT risks (Bakshi, 2012), seize business opportunities, and achieve a greater return on investments (MAS, 2014). ISACA (2012) indicated that the key constructs of the risk IT model are risk governance, risk evaluation, and risk response. The results for the validity

(NFI = 0.960, CFI = 0.970, TLI = 0.955, and IFI = 0.970) and reliability (Cronbach alpha value = 0.999) tests indicated that the risk IT framework, one of the two volumes of the risk IT model, was appropriate to measure credit unions' IT risk management initiatives. The validity and reliability results supported the arguments by Bashki (2012), Gill (2012), and Svatá (2013) that the risk IT framework is appropriate measurement for an institution's IT risk management initiatives. The risk IT framework fosters the understanding and communication of IT risks that affects business operations (Gill, 2012). Further, the risk IT framework can aid in defining a monitoring process for IT risk (Bashki, 2012). However, only nine items positively impacted the validity results, which may have been affected by the small sample size. One hundred and two responses were complete and included in the study. Jain and Raj (2013) and Feldt (2014) suggested sample size affects the results of a CFA test. Therefore, a larger sample size could yield different validity results.

An international framework such as the risk IT framework serves as benchmarks for determining the effectiveness of an institution's IT risk management initiatives (Al-Ahmad & Mohammad, 2013). According to ISACA (2012), the overall score for an institution's risk management initiatives otherwise named IT risk management maturity level, ranges from 0 to 5. The highest attainable score for an institution's maturity level is 5, and the lowest attainable score for an institution's maturity level is 0 (ISACA, 2012). The study result indicated the average maturity score for the 13 credit unions in Jamaica was 2.09. Achieving a maturity level of two indicates the IT risk management activities of the credit unions were not ad hoc but follow a regular pattern of management (ISACA,

2012). The result also suggested that the IT risk management maturity score for some credit unions in Jamaica was below 2.09. A maturity score below 2 suggests that the IT risk management initiatives of the institutions were either disorganized or absent. With the reliance on technology to maintain financial data, manage operational risks, and generate financial reports (Nastase & Unchiasu, 2013), management of IT risks is crucial. Therefore, credit unions with maturity scores below 2.09 should seek to implement effective IT risk management programs to minimize the effects of data loss (Al-Saiyd & Sail, 2013), data leakage (Choi & Shin, 2014), software project failure (Elzamly & Hussin, 2014), and wrong IT investments (Barnier, 2011). Credit unions with maturity scores above 2.09 but below five should also seek to strengthen their IT risk management initiatives. Gartner (2015) suggested that IT risk management is an on-going business process to protect an institution's electronic data, and therefore credit unions with maturity levels of five should continue to review new IT threats and develop appropriate strategies to manage these threats.

Institutions need to measure the effectiveness of their business decisions, and hence analysis of the financial performance of an institution by management is critical (Erdogan et al., 2015). In this study, ROA measures the financial performance of credit unions in Jamaica. Researchers such as Karim and Alam (2013) and Vaidean (2014) used ROA as one of the financial indicators to measure the financial performance of an institution. The results of the multiple regression suggested that IT risk management and institution size affected the financial performance of the Jamaican credit unions. The regression results produced data that supported the alternative hypothesis. The alternative

hypothesis was there is a statistically significant relationship between IT risk management, institution size, and financial performance. The main contributor to the relationship between the study variables was the institution size. In this study, asset measured in dollars was the proxy for institution size. The results of this study confirmed that there is a negative relationship between institution size and financial performance. Thus, as Jamaican credit unions increase in size, their financial performance decreases. In the study on commercial banks in Bangladesh, Karim and Alam (2013) suggested there is a negative correlation between bank size, credit risk, and operation efficiency. The findings of this study did not indicate IT risk management was a significant contributor to the financial performance of Jamaican credit unions. However, credit union leaders should not ignore the importance of IT risk management. Carcary (2013) noted the management of IT risks is essential to realize the benefits of technology in business.

Applications to Professional Practice

A quantitative correlation study was relevant to the understanding of the relationship between the research variables. Goldstein et al. (2011) suggested that a negative relationship existed between unmanaged IT risks and the financial performance of an institution. MAS (2014) also highlighted that unmanaged IT risks affect the financial performance of financial institutions. The findings of this study indicated that there is a relationship between IT risk management, institution size, and financial performance of Jamaican credit unions. Despite IT risk management not being a significant contributor to financial performance in Jamaican credit unions, the findings indicated that IT risk management along with institution size affected the financial

performance of the Jamaican credit unions. According to Carcary (2013), IT risks accompanies the use of technology in business, and therefore management of these risks is crucial. Jamaican credit union leaders should balance the business opportunities presented by the use of technology to improve the institution's financial performance with IT risks. Management should seek to manage IT risks to an acceptable level defined by the institution's risk appetite. Using an international framework to assess the IT risk management initiatives of the Jamaican credit unions provides an excellent perspective for these leaders to review their IT risk management activities. The findings of the study indicated that ISACA (2012) risk IT framework was both reliable and valid to measure an institution's IT risk initiatives. The key constructs of the risk IT framework enable credit union leaders to align the IT business risk initiatives with the institution's overall risk management strategies (Svatá, 2013). Therefore, Jamaican credit union leaders should be able to manage effectively risks associated with technology by using the risk IT framework to assess current initiatives and strengthen the institution's risk governance, risk evaluation, and risk response activities.

Prior studies involving a review of the factors affecting the financial performance of an institution included the impact of risk management and corporate governance (Baxter et al., 2013; Lindo, 2013; Quaresma et al., 2013). Using data from credit unions in Jamaica, the findings expand the body of literature on factors influencing financial performance, which include IT risk management and institution size. The findings from the study indicated that the financial performance, measured by the institution's ROA, of smaller credit unions was greater than larger credit unions, where asset in dollars was the

measurement of institution size. The results of the research may help credit union leaders to review their resource allocation so that they can remain viable in the competitive business environment. The findings are relevant to professional practice as the study may provide a practical guide for credit union management to modify business practices and improve business strategies that might promote financial growth.

Implications for Social Change

The Jamaican credit unions operate within the financial industry of the country (BAJ, 2015). According to Karim and Alam (2013), financial institutions can affect the financial environment of any economy. Through high margins from non-interest related activities, increase returns on the institution's asset, and a managed loan portfolio, leaders of financial institutions can positively influence an institution's financial performance (Wan-Jiun, Porter, & Sopranzetti, 2014). Further, the use of international standards such as the risk IT framework may aid the credit union leaders in managing IT risks. According to Goldstein et al. (2011) and Farah (2012), unmanaged IT risks negatively affect the financial performance of institutions. The implication for social change from this study includes additional information that may aid the leaders in understanding factors influencing the financial performance of the Jamaican credit unions. According to Marwa and Aziakpono (2016), there is a relationship between financial sector development and economic growth of a country. Knowledge of factors influencing institutions within the financial sector may provide insights for managers to develop and implement activities and policies to improve efficiency for these establishments (Marwa & Aziakpono, 2016). Therefore, understanding the factors affecting the financial

performance of the credit unions could result in the implementation of appropriate strategies to achieve efficiency and profitability. Efficient and profitable Jamaican credit unions can aid the national economy by improving the well-being of over 1 million credit union members through the offer of competitive credit and deposit interest rates, the payment of dividends, and the increase contribution to the surrounding communities through their community relation activities. The improved welfare of the Jamaican credit union members might enable the members to acquire a home, afford higher education, increase employment opportunities, and increase financial security.

Recommendations for Action

The evaluation of the finding of this study provided a platform for recommended actions for credit unions in Jamaica. The findings revealed that IT risk management and institution size affect the financial performance of credit unions in Jamaica. One action that the Jamaican credit union leaders can take is to implement an effective IT risk management program. This IT risk management program should include risk governance, risk evaluation, and risk response activities. Another action is the implementation of strategies to improve the institutions' financial performance measured by ROA. These strategies include obtaining higher margins from non-interest related activities, acquiring profits from assets, and managing the institution's loan portfolio (Wan-Jiun, Porter, & Sopranzetti, 2014). The reader should remember that the ROA, the measured indicator for the credit union's financial performance is net profit divided by the total asset (Ferrouhi, 2014). Assets include loans, securities, investments and placements with other financial institutions (Indriastuti & Ifada, 2016).

In addition to credit union leaders, factors influencing the financial performance of credit unions should receive more attention from academics and business consultants. Credit unions offer retail financial services similar to banks (Tokle & Tokle, 2015). Compared to banks, there are fewer scholarly articles on credit unions that credit union leaders can use to obtain information relating to their business practices. A search in Business Complete database, Computers and Applied Science Complete database, Primary Search Complete database, EBSCOhost database, and Academic Search Complete database produced a significant gap in the number of peer-reviewed articles using the keywords banks and technology compared to credit unions and technology for the period of 2002 and 2012. Publishing the results of this study may allow a larger population outside the academic community access to the study finding, which may guide strategic decisions made by credit union leaders to achieve profitability. I will disseminate the finding of the research through a one-page leaflet to the Jamaica Cooperative Credit Union League Limited and the credit unions in Jamaican. I will also disseminate the study finding using scholarly and business journals, workshops and conferences relating to credit unions, IT risk management, or financial performance.

Recommendations for Further Research

The results of the study highlighted an insignificant correlation between IT risk management and financial performance of credit unions in Jamaica. However, future studies could include an investigation on the relationship between the individual constructs of the risk IT framework, which are risk governance, risk evaluation, and risk response, and the financial performance of the credit unions in Jamaica. These studies

could also include other financial ratios used to measure financial performance such as capital adequacy ratio (CAR), net interest margin (NIM), net profit margin (NPM), and cash flow. Researchers such as Karim and Alam (2013) and Berrios (2013) included financial ratios such as NIM and ROA in their study on financial performance. Dreca (2012) used financial ratios such as ROA, ROE, and CAR to measure the financial performance of banks in Bosnia, Herzegovina, Croatia, Serbia, and Slovenia.

The findings of the study indicated that institution size was a significant predictor of the financial performance of Jamaican credit unions. A small sample size limited the analysis of the relationship between IT risk management, institution size, and financial performance. Future researchers could solicit participants' responses using both electronic and paper-based surveys. Thus, a less technologically savvy participant might participate in the survey, and therefore survey responses collected and analyzed could yield different results. Also, future researchers could employ a mixed-methods approach to providing interpretation and depth to factors affecting the financial performance of credit unions in Jamaican. A mixed-method study would enable a deeper understanding of the how the identified factors influence the financial performance of these institutions.

Reflections

The research process at Walden University has been a humbling experience. I felt overwhelmed because of the complexity of writing a doctoral level research project. As I immersed myself in the research project, the experience turned into a journey. During this journey, my understanding of IT risk management and institution size and their impact on financial performance increased. I also have a broader and deeper understanding of the

quantitative research process, which will serve me in both my current profession and in future research projects.

My initial attempt to obtain permission from credit union leaders to conduct the study with their employees was challenging. I had to solicit assistance from a team lead at Jamaica Cooperative Credit Union Limited, the supervisory body for credit unions, to encourage credit union leaders' involvement in the study. Some leaders welcomed the study and provided assistance by agreeing to participate in the study as well as encouraging employee participation in the survey. Some credit union leaders rejected my calls and failed to respond to any of my emails. Despite the challenges, the data collection process is valuable. Fifteen out of 34 existing credit union leaders gave consent to conduct the study. However, only 13 credit union leaders facilitated employee participation in the study.

I began this research project with no preconceived biases other than a desire to seek information on the impact of IT risk management on financial performance in Jamaican financial institutions. As part of the doctoral requirement for quantitative study at Walden University, I needed two independent variables. Thus, the study evolved to include two independent variables, which are IT risk management and institution size. The results indicate that IT risk management and institution size influence the financial performance of credit unions in Jamaica. The information garnered from the study should provide valuable information for credit union leaders in Jamaica and future researchers.

Summary and Study Conclusions

The study on the relationship between IT risk management measured using web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's ROA of credit unions in Jamaica was relevant considering that credit unions contribute to the financial industry in Jamaica. The goal was to determine whether a relationship existed between the three research variables by examining the financial performance of credit unions in Jamaica for the period 2012 to 2014. The results revealed a relationship between IT risk management, institution size, and financial performance with institution size being the main contributor to the relationship. The results of the study should provide valuable information on factors influencing Jamaican credit unions' financial performance, and so assist the credit union leaders in their strategic business decisions.

References

Acharya, A., Prakash, A., Saxena, P., & Nigam, A. (2013). Sampling: Why and how of it. *Indian Journal of Medical Specialities, 4*, 330-333. doi:10.7713/ijms.2013.0032

Adusei, M. (2013). Determinants of credit union savings in Ghana. *Journal of International Development, 25*, 22-30. doi:10.1002/jid.2828

Agha, S., Alrubaiee, L., & Jamhour, M. (2012). Effect of core competence on competitive advantage and organizational performance. *International Journal of Business and Management, 7*(1), 192-204. doi:10.5539/ijbm.v7n1p192

Aguinis, H., & Edwards, J. (2014). Methodological wishes for the next decade and how to make wishes come true. *Journal of Management Studies, 51*,143-174. doi:10.1111/joms.12058

Ajiboye, J., Ajiboye, M., & Omozokpia, J. (2013). The challenge posed by information technology to secretaries: A study with reference to Federal Polytechnic, Bida, Niger State, Nigeria. *IUP Journal of Information Technology, 9*(4), 23-40. Retrieved from http://www.iupindia.in

Akpınar, B., & Küçükgüçlü, Ö. (2012). The validity and reliability of the Turkish version of the quality of life scale for patients with Alzheimer's disease (QOL-AD). *Journal of Neurological Sciences (Turkish), 29,* 554-565. Retrieved from http://jns.dergisi.org

Al-Ahmad, W., & Mohammad, B. (2013). Addressing information security risks by adopting standards. *International Journal of Information Security Science, 2,* 28-43. Retrieved from http://www.ijiss.org

Albaum, G., Roster, C., & Smith, S. (2014). Topic sensitivity and research design: Effects on internet survey respondents' motives. *Asia Pacific Journal of Marketing and Logistics, 26,* 147-161. doi:10.1108/APJML-12-2012-0127

Al-Saiyd, N., & Sail, N. (2013). Data integrity in cloud computing security. *Journal of Theoretical and Applied Information Technology, 58,* 570-581. Retrieved from http://www.jatit.org

Arendacká, B. (2012). A note of fiducial generalized pivots for σ in one-way heteroscedastic ANOVA with random effects. *Statistics, 46,* 489-504. doi:10.1080/02331888.2010.540669

Arora, A. (2012). The impact of size on credit risk management strategies in commercial banks: Empirical evidence from India. *IUP Journal of Financial Risk Management, 9*(3), 24-44. Retrieved from http://www.iupindia.in

Astill, S., Harvey, D., & Taylor, A. (2013). A bootstrap test for additive outliers in non-stationary time series. *Journal of Time Series Analysis, 34,* 454-465. doi:10.1111/jtsa.12033

Atul, A., & Shashi, S. (2015). Issues of sample size in sensitivity and specificity analysis with special reference to oncology. *Journal of Cancer Research & Therapeutics, 11*, 482-484. doi:10.4103/0973-1482-139396

Azhagaiah, R., & Silambarasan, D. (2014). Firm size and corporate leverage: Cement industry. *SCMS Journal of Indian Management*, *11*(3), 37-50. Retrieved from http://www.scmsgroup.org

Babb, S. (2013). Are COSO 2013 and COBIT 5 compatible. *COBIT Focus, 3*, 9. Retrieved from http://www.isaca.org

Babbie, E. (2012). *The practices of social research* (13th ed). Belmont, CA: Wadsworth Publishing Company.

Babu, M., Babu, A., & Sekhar, M. (2013). Enterprise risk management integrated framework for cloud computing. *International Journal of Advanced Networking and Applications, 5*, 1939-1950. Retrieved from http://www.ijana.in

Baciu, O., & Parpucea, I. (2013). A model to minimize multicollinearity effects. *Annals of the University of Oradea, Economic Science Series, 22*(1), 699-706. Retrieved from http://anale.steconomiceuoradea.ro

Bailey, L. (2014). The origin and success of qualitative research. *International Journal of Market Research, 56*, 167-181. doi:10.2501/ijmr-2014-013

Baker, R., Anderson, H., Bishop, S., Macleod, A., Parkinson, N., & Tuffen, M. (2014).The UK plant health risk register: A tool for prioritizing activities. *EPPO Bulletin, 44*, 187-194. doi:10.11111/epp.12130

Bakla, A., Cekic, A., & Kosksai, O. (2013). Web-based surveys in educational research. *International Journal of Academic Research, 5*(1), 5-13. doi:10.7813/2075-4124.2013/5-1/B.1

Bakshi, S. (2012). Risk IT framework for IT risk management: A case study of National Stock Exchange of India Limited. *Cobit Focus, 1*, 5-10. Retrieved from http://www.isaca.org

Balkin, R., & Sheperis, C. (2011). Evaluating and reporting statistical power in counseling research. *Journal of Counseling & Development, 89*, 268-272. Retrieved from http://www.wiley.com

Bank of Jamaica. (2015). Bank of Jamaica 2012 Annual Report. Retrieved from http://www.boj.org.jm

Bankers Association of Jamaica. (2015). Our Industry. Retrieved from http://www.jba.org.jm

Baxter, R., Bedard, J., Hoitash, R., & Yezegel, A. (2013). Enterprise risk management program quality: Determinants, value relevance, and the financial crisis. *Contemporary Accounting Research, 30*, 1264-1295. doi:10.1111/j.1911-3846.2012.01194.x

Ben-David, I. Graham, J., & Harvey, C. (2013). Managerial miscalibration. *Quarterly Journal of Economics, 128*, 1547-1584. Retrieved from http://qje.oxfordjournals.org

Berrios, M. (2013). The relationship between bank credit risk and profitability and liquidity. *The International Journal of Business and Finance Research, 7*(3), 105-118. Retrieved from http://www.theibfr.com

Beser, A., Kucukguclu, O., Bahar, Z., & Akpinar, B. (2012). Study of validity and reliability of the scale regarding the expectations about aging. *HealthMed Journal, 6*, 3107-3112. Retrieved from http:// healthmed.ba

Bevan, S., Baumgartner, F., Johnson, E., & McCarthy, J. (2013). Understanding selection bias, time lags and measurement bias in secondary data sources: Putting the

Encyclopedia of Associations database in broader context. *Social Science Research, 42,* 1750-1764. doi:10.1016/j.ssresearch.2013.08.003

Biswas, A., Goswami, S., Baruah, D., & Tripathy, R. (2012). The potential risk factors and the identification of hearing loss in infants. *Indian Journal Otolaryngology & Head & Neck Surgery, 64,* 214-217. doi:10.1007/s12070-011-0307-6

Bosco, F., Singh, K., Aguinis, H., Field, J., & Pierce, C. (2015). Correlation effect size benchmarks. *Journal of Applied Psychology, 100,* 431-449. doi:10.1037/a0038047

Bradley, M., & Brand. A (2013). Alpha values as a function of sample size, effect size, and power: Accuracy over inference. *Psychological Reports: Measures and Statistics, 112,* 835-844. doi:10.2466/03.49.PRO.112.3.835-844

Brewer, E., & Jagtiani, J. (2013). How much did banks pay to become too-big-to-fail and to become systemically important. *Journal of Financial Services Research, 43,* 1-35. doi:10.1007/s10693-011-0119-6

Bubakova, P. (2015). The law of one price of Central European countries – analysis of feed barley. *Agris On-Line Papers in Economics & Informatics, 7*(2), 13-25. Retrieved from http://online.agris.cz

Busch, S., & Gick, M. (2012). A quantitative study of choral singing and psychological well-being. *Canadian Journal of Music Therapy, 18,* 45-61. Retrieved from http://www.musictherapy.ca

Cagliano, A., De Marco, A., Grimaldi, S., & Rafele, C. (2012). An integrated approach to supply risk analysis. *Journal of Risk Research, 15*, 817-840. doi:10.1080/13669877.2012.666757

Carcary, M. (2013). IT risk management: A capability maturity model perspective. *Electronic Journal Information Systems Evaluation, 16*, 3-13. Retrieved from http://www.ejise.com

Cardamone, A., Eboli, L., & Mazzulla, G. (2014). Drivers' road accident risk perception. A comparison between face-to-face interview and web-based survey. *Advances in Transportation in Studies, 33*, 59-72. doi:10.4399/97888548728995

Challa, V., Swamyvelu, K., & Shetty, N. (2013). Assessment of the clinical utility of the Gail model in estimating the risk of breast cancer in women from the Indian population. *Ecancermedicalscience*, 7, 1-7. doi:10.3332/ecancer.2013.363

Chandrakantha, L. (2015). Simulating one-way ANOVA using resampling. *The Electronic Journal of Mathematics and Technology, 9*, 281-293. Retrieved from https://php.radford.edu

Chen, A., Lu, Y., Chau, P., & Gupta, S. (2014). Classifying, measuring, and predicting users' overall active behaviour on social networking sites. *Journal of Management Information Systems, 31*(3), 213-253. doi:10.1080/07421222.2014.995557

Chen, C., Chen, C., & Wang, X. (2014). Cloud service capability maturity model (CS-CMM): A preliminary study on its conceptual design. *International Journal of*

Electronic Business Management, 12(3), 190-199. Retrieved from http://www.ijebm.ie.nthu.edu.tw

Chewaskulyong, B., Sapinun, L., Downing, G., Intaratat, P., Lesperance, M., Leautrakul, S., Somwangprasert, A., & Leerapun, T. (2012). Reliability and validity of the Thai translation (Thai PPS Adult Suandok) of the palliative performance scale (PPSv2). *Palliative Medicine, 26*, 1034-1041. doi:10.1177/0269216311424633

Choi, H., & Shi, S. (2014). Design of safe internal network with the use of active tracking system. *International Journal of Security and Its Applications, 8,* .291-300. doi:10.14257/ijsia.2014.8.2.30

Choi, S., Son, C., Lee, J., & Cho, S. (2015). Confirmatory factor analysis of the Korean version of the short-form McGill pain questionnaire with chronic pain patients: A comparison of alternative models. *Health and Quality of Life Outcomes, 13*:15, 1-5. doi:10.1186/s12955-014-0195-z

Cohen, J. (1992). A Power Primer. *Psychological Bulletin, 112*(1), 155-159. doi:10.1037/0033-2909.112.1.155

Collard, M., Ruttle, A., Buchanan, B., & O'Brien, M. (2013). Population size and cultural evolution in nonindustrial food-processing societies. *Plos One, 8*(9), 1. doi:10.1371/journal.pone.0072628

Committee of Sponsoring Organizations of the Treadway Commission. (2004). Enterprise risk management – integrated framework. Retrieved from http://www.coso.org

Costa, A., Banderira, D., & Nardi, H. (2013). Systematic review of instruments measuring homophobia and related constructs. *Journal of Applied Social Psychology, 43*, 1324-1332. doi:10.111/jasp.12140

Costa e Silva, S., & Duarte, P. (2014). Suggestions for international research using electronic surveys. *Marketing Review, 14*, 297-309. doi:10.1362/146934714X14024779061992

Croitoru, I. (2014). Operational risk management and monitoring. *Internal Auditing & Risk Management*, *9*(4), 21-31. Retrieved from http://amir.univath.ro

Croke, J., Vickers, M., Heng, D., Reaume, M., Song, X., Meng,J., Asmin, T., & Lochrin, C. (2012). Continuity clinics in oncology training programs in Canada. *Current Oncology, 19*, e329-e342. doi:10.3747/co.19.1046

Darvish, H., & Temelie, Z. (2014). A study on the relationship between successful planning and strategic planning. A case study: Payame Noor University of Aleshtar. *Economic Insights – Trends and Challenges, 66*(1), 11-24. Retrieved from http://www.upg-bulletin-se.ro

D'Aquila, J. (2013). COSO's internal control integrated framework. *CPA Journal, 83*(10), 22-29. Retrieved from http://www.cpajournal.com

D'Aquila, J., & Houmes, R. (2014). COSO's updated internal control and enterprise risk management frameworks. *CPA Journal*, *84*(5), 54-59. Retrieved from http://www.cpajournal.com

Debreceny, R. (2013). Research on IT governance, risk, and value: Challenges and Opportunities. *Journal of Information Systems, 27*(1), 129 – 135. doi:10.2308/isys-10339

Debreceny, R., & Gray, G. (2013). IT governance and process maturity: A multinational field study. *Journal of Information Systems, 27*(1), 157-188. doi:10.2308/isys-50418

Delen, D., Kuzey, C, & Uyar, A. (2013). Measuring firm performance using financial ratios: A decision tree approach. *Expert Systems with Applications, 40*, 3970–3983. doi:10.1016/j.eswa.2013.01.012

Donaldson, L., Qiu, J., & Luo, B. (2013). For rigor in organizational management theory research. *Journal of Management Studies, 50*, 153-172. doi:10.1111/j.1467-6486.2012.01069.x

Dong, S., Ding, W., & Chen, L. (2012). Measure correlation analysis of network flow based on symmetric uncertainty. *KSII Transactions on Internet & Information Systems, 6*, 1649-1667. doi:10.3837/tiis.2012.06.009

Dreca, N. (2012). Evaluation of financial performance of banking sector: Evidence from Bosnia and Herzegovina, Croatia, Serbia and Slovenia. *Journal of Economic and Social Studies, 2*(2), 65-92. doi:10.14706/jecoss11224

Drughi, M., & Hjemdal, O. (2013). Factor structure of the Student-Teacher Relationship Scale for Norwedian school – age children explored with confirmatory factor analysis. *Scandinavian Journal of Educational Research, 57*, 457-466. doi:10.1080/003113831.2012.656697

Duuggan, J., & Peo, C. (2013). Preparing to implement the 2013 COSO framework. *Financial Executive, 29*(7), 12-13. Retrieved from http://www.financialexecutives.org

Dumitrescu, L., Stanciu, O., Tichindelean, M., & Vinerean, S. (2012). The use of regression analysis in marketing research. *Studies in Business & Economics, 7*(2), 94-109. Retrieved from http://eccsf.ulbsibiu.ro

Eisend, M. (2015). Have we progressed marketing knowledge. A meta-meta-analysis of effect sizes in marketing research. *Journal of Marketing, 79*(3), 23-40. doi:10.1509/jm.14.0288

El-Chaarani, H. (2015). The impact of financial and legal structures on the performance of European listed firms. *International Journal of Business & Finance Research, 9*(2), 39-52. Retrieved from http://www.theibfr.com/

Ellul, A., & Yerramilli, V. (2013). Stronger risk controls, lower risk: Evidence from U.S. bank holding companies. *Journal of Finance, 68*, 1757-1803. doi:10.1111/jofi.12057

Elzamly, A., & Hussin, B. (2014). A comparison of fuzzy and stepwise multiple regression analysis techniques for managing software project risks: Implementation phase. *International Management Review, 10*(1), 43-54. Retrieved from http://www.usimr.org

Emerson, R. (2015). Convenience sampling, random sampling, and snowball sampling. How does sampling affect the validity of research. *Journal of Visual Impairment & Blindness, 109*, 164-168. Retrieved from http://www.afb.org

Erdogan, E., Erdogan, M., & Omurbek, V. (2015). Evaluating the effects of various financial ratios on company financial performance: Application in Borsa Istanbul. *Business & Economics Research Journal, 6*(1), 35-42. Retrieved from http://www.berjournal.com

Esbouel, K., Ghadikolaei, A., & Antucheviciene, J. (2014). Using fanp and fuzzy vikor for ranking manufacturing companies based on their financial performance. *Economic Computation & Economic Cybernetics Studies & Research, 48*(3), 287-308. Retrieved from http://www.ecocyb.ase.ro

Evans, M., Hoddar, L., & Hopkins, P. (2014). The predictive ability of fair values for future financial performance of commercial banks and the relations of predictive ability to banks' share prices. *Contemporary Accounting Research, 31*, 13-44. doi:10.111/1911-3846.12028

Eyyam, R., & Yaratan, H. (2014). Impact of use of technology in mathematics lessons on student achievement and attitudes. *Social behaviour & Personality, 42*, 531-542. doi:10.2224/sbp.2014.42.0.531

Fabling, R., Grimes, A., & Stevens, P. (2012). The relatives are fine: Use of qualitative firm data in economic analysis. *Applied Economics Letters, 19*, 615-618. doi:10.1080/13504851.2011.591722

Falessi, D., Shaw, M., & Mullen, K. (2014). Achieving and maintaining CMMI maturity level 5 in a small organization. *IEEE Software*, *31*(5), 80-86. doi:10.1109/MS.2014.17

Farah, B. (2011). A maturity model for the management of information technology risk. *International Journal of Technology, Knowledge & Society, 7*(1), 13-25.Retrieved from http://miar.ub.edu/issn/1832-3669

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*, 1149-1160. doi:10.3758/BRM.41.4.1149

Fedlt, R. (2014). Gender invariance of item-cluster subcomponents of the NEO-FFI: A multigroup confirmatory factor analysis. *Individual Differences Research, 12*, 59-68. Retrieved from http://ores.su/en/journals/individual-differences-research/

Feldt, R., Lee, J., & Dew, D. (2014). Criterion validity of facets versus domains of the Big Five Inventory. *Individual Differences Research, 12*, 112-122. Retrieved from http://ores.su/en/journals/individual-differences-research

Ferguson, C., Green, P., Vaswani, R., & Wu, G. (2013). Determinants of effective information technology governance. *International Journal of Auditing, 17*, 75–99. doi:10.1111/j.1099-1123.2012.00458.x

Fernandez-Hermida, J., Calafat, A., Becona, E., Tsertsvadze, A., & Foxcroft, D. (2012). Assessment of generalizability, applicability and predictability (GAP) for evaluating external validity in studies of universal family-based prevention of alcohol misuse in young people: systematic methodological review of randomized controlled trials. *Addiction, 107*, 1570-1579. doi:10.1111/j.1360-0443.2012.03867.x

Ferrouhi, E. (2014). Bank liquidity and financial performance: Evidence from Moroccan banking industry. *Business: Theory & Practice, 15*, 351-361. doi:10.3846/btp.2014.35

Fox, C. (2012). Creating value with risk appetite and risk tolerance statements. *Financial Executive, 28(9)*, 93-95. Retrieved from http://www.financialexecutives.org

Frels, R., & Onwuegbuzie, A. (2013). Administering quantitative instruments with qualitative interviews: A mix research approach. *Journal of Counseling & Development, 91*, 184-192. doi:10.1002/j.1556-6676.2013.00085.x

Gardner, R., & Neufeld, R. (2013). What the correlation coefficient really tells us about the individual. *Canadian Journal of Behavioural Science, 45*, 313-319. doi:10.1037/a0033342

Gartner. (2015). IT risk management. Retrieved from http://www.gartner.com

Gates, S., Nicholas, J., & Walker, P. (2012). Enterprise risk management: A process for enhanced management and improved performance. *Management Accounting Quarterly, 13*(3), 28-38. Retrieved from http://www.imanet.org

Ghapor, A., Zubairi, Y., Mamum, A., & Imon, A. (2014). On detecting outlier in simple linear functional relationship model using Covratio statistic. *Pakistan Journal of Statistics, 30*, 129-142. Retrieved from http://www.pakjs.com

Gibbs, N., & Weightman, W. (2014). An audit of the statistical validity conclusion of clinical superiority in anesthesia journal. *Anaesthesia & Intensive Care, 42*, 599-607. Retrieved from http://www.aaic.net.au

Gill. M. (2012). IT risk is business risk. *COBIT Focus, 2,* 10-11. Retrieved from http://www.isaca.org

Gillespie, N., Dietz, G., & Lockey, S. (2014). Organizational reintegration and trust repair after an integrity violation: A case study. *Business Ethics Quarterly, 23,* 371-410. doi:10.5840/beq2014437

Goddard, J., McKillop D., & Wilson, J. (2012). Regulatory change and capital adjustment of financial institutions. *SSRN Electronic Journal*, 1-24. doi:10.2139/ssrn.1531570

Goldstein, J., Chernobai, A., & Benaroch, M. (2012). An event study analysis of the economic impact of IT operational risk and its subcategories. *Journal of the Association for Information Systems, 12*, 606-631. Retrieved from http://aisel.aisnet.org

Gorzen-Mitka, I. (2013). Risk identification tools - Polish MSMES companies practices. *Problems of Management in the 21st Century, 7*, 6-11. Retrieved from http://www.jbse.webinfo.lt

Guglyuvatyy, E., & Stoianoff, N. (2015). Applying the Delphi method as a research technique in tax law and policy. *Australian Tax Forum, 30,* 179-204. Retrieved from http://www.taxinstitute.com.au

Hagel, R. (2014). Not-for-profit delve into risk management. *Journal of Accountancy, 218*(5), 24-25. Retrieved from http://www.journalofaccountancy.com/

Halbesleben, J., & Whitman, M. (2013). Evaluating survey quality in health service research: A decision framework for assisting nonresponse bias. *Heath Service Research, 48,* 919-930. doi:10.1111/1475-6773.12002

Hall, C., Murphy Enright, S., White, S., & Allen, S. (2015). A quantitative study of the emotional intelligence of participants in the ASHP Foundation's Pharmacy Leadership Academy. *American Journal of Health System Pharmacy, 72,* 1890-1895. doi:10.2146/ajhp140812

Haneef, S., Riaz, T., Ramzan, M., Rana, M., Ishag, H., & Karim, Y. (2012). Impact of risk management on non-performing loans and profitability of banking sector of Pakistan. *International Journal of Business and Social Science, 3*(7), 307-314. Retrieved from http://www.ijbssnet.com

Harding, J. (2014). Seven tools for project success. *Chemical Engineering, 121*(1), 36-41. Retrieved from http://www.chemengonline.com

Hardy, C., & Williams, S. (2010). Managing information risks and protecting information assets in a Web 2.0 era. *BLED Proceedings*. Retrieved from http://aisel.aisnet.org

Hassan, S., Farhan, M., Mangayil, R., Huttunen, H., & Aho, T. (2013). Bioprocess data mining using regularized regression and random effects. *BMC Systems Biology, 7*(1), 1-7. doi:10.1186/1752-0509-7-s1-s5

Hays, F., & Ward, S. (2013). Technology leaders vs laggards, evidence from the credit union industry. *Journal of Technology Research, 4,* 1-15. Retrieved from http://www.aabri.com

Heroux, S., & Fortin, A. (2013). The internal audit function in information technology governance: A holistic perspective. *Journal of Information Systems, 27*(1), 189–217. doi:10.2308/isys-50331

Herrewijin, L., & Poels, K. (2013). Putting brands into play:How game difficulty and player experiences influence the effectiveness of in-game advertising. *International Journal of Advertising, 32*(1), 17-44. doi:10.2501/ija-32-1-017-044

Herrmann, A. (2013). The qualitative estimation of IT-related risk probabilities. *Risk Analysis, 33,* 1510-1529. doi:10.1111/risa.12001

Horga, G., Kaur, T. & Peterson, B. (2014). Annual research review: Current limitations and future directions of MRI studies of child and adult onset development psychopathologies. *Journal of Child Psychology and Psychiatry, 55,* 659-680. doi:10.1111/jcpp.12185

Huihua, L., Xu, Y., Han, L., & Zhou, F. (2015). Scale-dependence effects of landscape on seasonal water quality in Xitiaoxi catchment of Taihu Basin, China. *Water Science & Technology, 71,* 59-66. doi:10.2166/wst.2014.463

Hulson, P., Hanselman, D., & Quinn, T. (2012). Determining effective sample size in integrated age-structured assessment models. *ICES Journal of Marine Science, 69,* 281-292. doi:10.1093/icesjms/fsr189

Humayun, S., Ashar, A., & Ahmad, A. (2014). Student's perception of labor room learning environment. *Pakistan Armed Forces Medical Journal, 64*, 277-286. Retrieved from http://www.pafmg.org

Hunsaker, S., Chen, H., Maughan, D., & Heaston, S. (2015). Factors that influence the development of compassion fatigue, burnout, and compassion satisfaction in emergency department nurses. *Journal of Nursing Scholarship, 47*,186-194. doi:10.1111/jnu.12122

Ibrahim, N. (2014). IT Audit 101. *Internal Auditor, 71*(3), 19-21. Retrieved from http://www.theiia.org

Ilott, I., Bennett, B., Gerrish, K., Pownall, S., Jones, A., & Garth, A. (2014). Evaluating a novel approach to enhancing dysphagia management: Workplace-based, blended elearning. *Journal of Clinical Nursing, 23*, 1354-1364. doi:1111/jocn.12409

Iani, L., Barbaranelli, C., & Lombardo, C. (2015). Cross-validation of the reduced form of the Food Craving Questionnaire-Trait using confirmatory factor analysis. *Frontiers in Psychology, 6*, 1-8. doi:10.3389/fpsyg.2015.00433

Indriastuti, M., & Ifada, L. (2016). CAMELS: The trouble bank prediction. *International Journal of Organizational Innovation, 8*, 137-145. Retrieved from http://www.ijoi-online.org/

Institute of Internal Auditors. (2012). Model Management Control Policy. Retrieved from http://www.iia.org

International Organization for Standardization. (2015). ISO/Guide 73:2009. Retrieved from https://www.iso.org

Ionel-Alin, L., & Irimie Emil, P. (2013). Conceptual delimitations on sustainable development. *Annals of the University of Oradea Economic Science Series, 22*(1), 252-261. Retrieved from http://anale.steconomiceuoradea.ro/en/

Iovan, S., & Dinu, M. (2014). Impact of the loss and theft of electronic data on companies. *Fiability & Durability*, 39-44. Retrieved from http://journals.indexcopernicus.com/

ISACA. (2012). Risk IT Framework. Retrieved from http://www.isaca.org

ISACA. (2015). What is Cobit 5. Retrieved from http://www.isaca.org

Ismail, I. (2014). The effect of company size and leverage towards company performance: After Malaysian economic crisis. *International Journal of Management & Innovation, 6*(2), 32-48. Retrieved from http://www.journals.indexcopernicus.com/

Jackson, R. (2012). Facing IT risk head-on. *Internal Auditor*, *69*(4), 36-42. Retrieved from https://na.theiia.org/

Jain, V., & Raj, T. (2013). Evaluating the variable affecting flexibility in FMS by exploratory and confirmatory factor analysis. *Global Journal of Flexible Systems Management, 14,*181-193. doi:10.1007/s40171-013-0042-9

Jamaica Bankers Association. (2015). Our Industry. Retrieved from http://www.jba.org

Jamaica Cooperative Credit Union League Limited. (2015a). Who we are. Retrieved from http://creditunionsofjamaica.com/

Jamaica Cooperative Credit Union League Limited. (2015b). *Cubiz, 6(*16), 2. Retrieved from http://creditunionsofjamaica.com/

Jamaica Cooperative Credit Union League Limited. (2014). *Cubiz, 6(*9), 4 -5. Retrieved from http://creditunionsofjamaica.com/

Janvrin, D., Payne, E., & Brynes, P. (2012). The updated COSO internal control-integrated framework: Recommendations and opportunities for future research. *Journal of Information Systems, 26*(2), 189-213. doi:10.2308/isys-50255

Jinhyung K., Choonsik P., Jun H., & Hyung-Jong K. (2013). Privacy level indicating data leakage prevention system. *KSII Transactions on Internet and Information Systems, 7*, 558-574. doi:10.3837/tiis.2013.03.009

Juiz, C., & Toomey, M. (2015). To govern IT or not to govern IT. *Communications of the ACM, 58*(2), 58-64. doi:10.1145/2656385

Kapic, J. (2013). Internal supervision, internal control and internal audit. *Business Consultant, 5*(31), 62-73. Retrieved from http://www.finconsult.ba

Kaplowitz, M., Lupi, F., Couper, M., & Thorp, L. (2012). The effect of invitation design on web survey response rates. *Social Science Computer Review, 30*, 339-349. doi:10.1177/0894439311419084

Karim, R., & Alam, T. (2013). An evaluation of financial performance of private commercial banks in Bangladesh: Ratio analysis. *Journal of Business Studies Quarterly, 5*(2), 65-77. Retrieved from http://www.jbsq.org

Kim, S., & Seo, I. (2015). Artificial neural network ensemble modeling with exploratory factor analysis for streamflow forecasting. *Journal of Hydroinformatics, 17*, 614-639. doi:10.2166/hydro.2015.033

Kipo, D. (2013). Mixed research methods: Reflections on social public policy. *Asian Social Science, 9*, 259-268. doi:10.5539/ass.v9n17p259

Koch, K. (2013). Comparison of two robust estimations by expectation maximization algorithms with Huber's method and outlier tests. *Journal of Applied Geodesy, 7,* 115-123. doi:10.1515/jag-2013-0050

Kotane, I. (2015). Evaluating the importance of financial and non-financial indicators for the evaluation of company's performance. *Management Theory & Studies for Rural Business & Infrastructure Development, 37*, 80-90. doi:10.15544/mts.2015.08

Krstic, J., & Dordevic, M. (2013). Internal control and enterprise risk management – from traditional to revised COSO model. *Economic Themes, 50*(2), 151-166. Retrieved from http://www.economic-themes.com

Kutsch, E., Browning, T., & Hall, M. (2014). Bridging the risk pap: The failure of risk management in information systems projects. *Research Technology Management, 57*(2), 26-32. doi:10.5437/08956308X5702133

Lee, E., & Oh, S. (2013). Seek and you shall find. How need for orientation moderates knowledge gain from twitter use. *Journal of Communication, 63*, 745-765. doi:10.1111/jcom.12041

Leedy, P. D., & Ormrod, J. E. (2012). *Practical research: Planning and design* (10th ed.). Upper Saddle River, NJ: Prentice Hall.

Li, L. (2014). Game theory and SPSS variance analysis based table tennis service direction affects score research. *Journal of Chemical Pharmaceutical Research, 6*, 1023-1028. Retrieved from http://www.jocpr.com

Li, Z., Ajuwon, P., Smith, D., Griffin-Shirley, N., Parker, A., & Okungu, P. (2012). Assistive technology competencies for teachers of students with visual impairments: A national study. *Journal of Visual Impairment & Blindness, 106*, 656-665. Retrieved from http*://www.afb.org*

Lindo, S. (2013). Risk management infrastructure as a living organism. *Journal of Risk Management in Financial Institution, 6*, 67-74. Retrieved from http://www.henrystewartpublications.com

Ling, L., Zain, M., & Jaffar, N. (2014). Determinants of risk management committee formation: An analysis of publicly held firms. *Academy of Accounting & Financial Studies Journal, 18*(1), 37-47. Retrieved from http://www.alliedacademies.org

Lira, E., Ripoll, P., Peiro, J., & Zornoza, A. (2013). The role of information and communication technologies in the relationship between group potency and group maintenance outcome: A longitudinal study. *Behaviour & Information Technology, 32*, 147-155. doi:10.1080/0144929x.2011.630421

Loo, S., Abdul-Rahman, H., & Wang, C. (2013). Managing external risks for international architectural engineering, and construction (AEC) firms operating in Gulf Cooperation Council (GCC) States. *Project Management Journal, 44*(5), 70-88. doi:10.1002/pmj.21365

Lundqvist, S. (2014). An exploratory study on enterprise risk management: Pillars of ERM. *Journal of Accounting, Auditing & Finance, 29*, 393-429. doi:10.1177/0148558x1435780

Maddux, C., & Johnson, D. L. (2012). External validity and research in information technology in education. *Computers in the Schools, 29*, 249-252. doi:10.1080/07380569.2012.703605

Malhotra, M.,& Sharma, S. (2008). Measurement equivalence using Generalizability Theory: An examination of manufacturing flexibility dimensions. *Decision Sciences, 39*, 643-669. doi:10.1111/j.1540-5915.2008.00207.x

Mandy, W. & Roughan, L. & Skuse, D. (2014). Three dimensions of oppositionality in autism spectrum disorder. *J Abnorm Child Psychol, 42,*291–300. doi:10.1007/s10802-013-9778-0

Mar, S. (2014). An opportunity for improvement. *Internal Auditor, 71*(2), 25-27. Retrieved from http://www.theiia.org

Maria, E., Fibriani, C., & Sinatra, L. (2012). The measurement of information technology performance in Indonesian higher education institution in the context of achieving institution business goals using COBIT framework version 4.1. *Researchers World: Journal of Arts, Science & Commerce, 3*(3), 9-18. Retrieved from http://www.researchersworld.com

Martinez, C., & Scott, C. (2014). In search of the meaning of happiness through flow and spirituality. *The International Journal of Health, Wellness, & Society, 4(1)*, 37-49. Retrieved from http://www.ijw.cgpublisher.com

McAdams, R., Erdenebileg, A., Batra, M., & Gerelmaa, Z. (2012). Attitudes of healthcare providers towards non-initiation and withdrawal of neonatal resuscitation for

preterm infants in Mongolia. *Journal of Health, Population & Nutrition, 30*, 346-352. Retrieved from http://jhpn.biomedcentral.com/

McBride, M., Fider, F., & Burgman, M. (2012). Evaluating the accuracy and calibration of expert predictions under uncertainty: Predicting the outcomes of ecological research. *Diversity & Distributions, 18*, 782–794. doi:10.1111/j.1472-4642.2012.00884.x.

McKillop, D., & Wilson, J. O. (2011). Credit unions: A theoretical and empirical overview. *Financial Markets, Institutions & Instruments, 20*, 79-123. doi:10.1111/j.1468-0416.2011.00166.x

McLafferty, C., Slate, J., & Onwuegbuzie, A. (2010). Transcending the quantitative-qualitative divide with mixed methods research: A multidimensional framework for understanding congruence and completeness in the study of values. *Counseling & Values, 55*, 46-62. doi:10.1002/j.2161-007x.2010.tb00021.x

McNally, S. (2015). Risk leverage it. Control it. Win. *Financial Executive, 31*(1), 12-19. Retrieved from http://www.financialexecutives.org

McPeake, J., Bateson, M., & O'Neill, A. (2014). Electronic surveys: How to maximize success. *Nurse Researcher, 21*(3), 24-26. doi:10.7748/nr2014.01.21.3.24.e1205

Meenden, G. (2012). A Bayesian justification for random sampling in sample survey. *Pakistan Journal of Statistics & Operation Research, 8*, 353-357. Retrieved from http://www.pjsor.com

Mehdizadeh, R., Breysse, D., Taillander, F., & Niandou, H. (2013). Dynamic and multiperspective risk management in construction with a special view to

temporary structure. *Civil Engineering & Environmental Systems, 30,* 115-129. doi:10.1080/10286608.2012.733377

Mezuk, B., Lohman, M., Leslie, M., & Powell, V. (2015). Suicide risk in nursing homes and assisted living facilities 2003-2011. *American Journal of Public Health, 107,* 1495-1502. doi:10.2105/AJPH.2015.302573

Midi, H., & Bagheri, A. (2013). Robust multicollinearity diagnostic measures based on minimum covariance determination approach. *Economic Computation & Economic Cybernetics Studies & Research, 47*(4), 1-15. Retrieved from http://www.ecocyb.ase.ro/

Mishra, S. (2016). Technical analysis and risk premium in Indian equity market: A multiple regression analysis. *IUP Journal of Applied Economics, 15*(1), 51-68. Retrieved from http://www.iupindia.in/

Mohapatra, S., & Das, S. (2013). Information technology outsourcing risks in banks: A study of perception in the Indian banking industry. *Vilakshan, XIMB Journal 10*(2), 61-72. Retrieved from http://www.ximb.ac.in/

Monetary Authority of Singapore. (2014). Technology Risk Management Guidelines June 2013. Retrieved from http://www.mas.gov.sv

Monteiro, H., Wilson, J., & Beyer, D. (2013). Exploration of predictors of teaching effectiveness: The professor's perspective. *Current Psychology, 32,* 329-337. doi:10.1007/s12144-013-9186-1

Monzani, D., Steca, P., Greco, A., D'Addario, M., Capelletti, E., & Pancani, L. (2015). The situational version of the Brief COPE: Dimensionality and relationship with

goal-related variables. *Europe's Journal of Psychology, 11*, 295-310. doi:10.5964/ejop.v11i2.935

Morales, J. (2014). 6 Tips for implementing IT governance with COBIT 5. *COBIT Focus, 3*, 7-8. Retrieved from http://www.isaca.org

Motamedi Joybari, M., Gholipour, A., & Yazdani Charati, J. (2013). Effects of components of organizational culture and information technology on the implementation of knowledge management in Mazandaran University of Medical Science. *Journal of Mazandaran University of Medical Sciences, 23*(102), 58-65. Retrieved from http://jmums.mazums.ac.ir/

Nastuse, P., & Unchiasu, S. (2013). Implications of the operational risk practices applied in the banking sector on the information systems area. *Accounting and Management Information Systems, 12*, 101–117. Retrieved from http://www.cig.ase.ro/revista_cig/

National Institute of Standards and Technology. (2015). Risk management guide for information systems. Retrieved from http://www.nist.gov/

Neall, A., & Tuckey, M. (2014). A methodological review of research on the antecedents and consequences of workplace harassment. *Journal of Occupational and Organization Psychology, 87*, 225-252. doi:10.111/joop.12059

Nel, P., Plesis, M., & Bosman, L. (2015). Comparing different versions of the Rahim El questionnaire in a South African context: A confirmatory factor analysis approach. *South African Journal of Industrial Psychology, 41*, 1-9. doi:10.4102/sajip.v41i1.1220

Newton, C., & Teo, S. (2014) Identification and occupational stress: A stress-buffering perspective. *Human Resource Management, 53,* 89-113. doi:10.1002/hrm.21598

Ngo, T., Mullineux, A., & Ly, A. (2014). The impact of scale of operation on financial performance in microfinance. *Eurasian Economic Review, 4*, 177-198. doi:10.1007/S40822-014-0011-4

Norman, C., Payne, M., & Vendrzyk. V. (2009). Assessing information technology general control risk: An instructional case. *Issues in Accounting Education, 24*, 63-76. doi:10.2308/iace.2009.24.1.63

North Atlantic Treaty Organization. (2011). The NATO lessons learned handbook. Retrieved from http://www.nato.int

Oei, T., Sawang, S., Goh, Y., Mukhtar, F. (2013). Using the depression anxiety stress scale 21(DASS-21) across cultures. *International Journal of Psychology, 48*, 1018-1029. doi:10.1080/00207594.2012.755535

Olalekan, L., & Tajudeen, N. (2015). Cost control and its impact on the survival of Nigerian firms: A case study of Nigeria Bottling Company Plc. *International Journal of Management, Accounting & Economics*, *2*, 312-324. Retrieved from http://www.ijmae.com

Oliveira, S., Fernandez, D., & Sisto, F. (2014). Analysis of the school anxiety inventory in Brazil using the Rasch rating scale model. *Psychological Reports, 115*, 165-178. doi:10.2466/08.03.10.PRO.115c15z3

Otte, S., Bangerter, A., Britsch, M., & Wuthrich, U. (2014). Attitudes of coaches towards the use of computer-based technology in coaching. *Consulting Psychology Journal: Practices & Research*, 66, 38-52. doi:10.1037/a0035592

Pal, S., & Bhattacharya, M. (2013). An empirical study on the financial health of the main steel producing segment in India: Application of factor analysis and multiple regression analysis. *Decision, 40*(1–2), 47–55. doi:10.1007/s40622-013-0009-x

Pang, X., Qin, Z., Zhao, L., Chen, H., Song, H., & Wu, J. (2012). Development of regression model to differentiate quality of black tea (Dianhong): Correlate aroma properties with instrumental data using multiple linear regression analysis. *International Journal of Food Science & Technology, 47*, 2377-2379. doi:10.111/j.1365-2621.2012.03112.x

Paradamean, B., Suparyanto, T., & Kurniawan, R. (2013). Assessment of graph theory e-learning utilizing learning management systems. *Journal of Theoretical & Applied Information Technology, 5*5(3), 353-358. Retrieved from http://www.jatit.org

Park, K. S., Kang, J. H., Sa, K. H., Koo, H. B., Cho, H.J., Nam, E. J., Youn, I.C., Kim, K. M., Kim, I. S., Kwon, I.C., Choi, K. W., & Kang, Y. M. (2012). In vivo quantitative measurement of arthritis activity based on hydrophobically modified glycol chitosan in inflammatory arthritis: More active than passive accumulation. *Molecular Imaging, 11*, 389-400. doi:10.2310/7290.2011.00056

Pirog, M. (2014). Internal verses external validity: Where are policy analysts going. *Journal of Policy Analysis and Management, 33,* 548-550. doi:10.1002/pam.21753

Pitman, S. (2013). Evaluating a self-directed palliative care learning package for rural aged care workers: A pilot study. *International Journal of Palliative Nursing, 19,* 290-294. doi:10.12968/ijpn.2013.19.6.290

Pretorius, S., Steyn, H., & Jordaan. (2012). Project management maturity and project management success in the engineering and construction industries in South Africa. *South Africa Journal of Industrial Engineering, 23*(3), 1-12. Retrieved from http://www.saiie.co.za

Project Management Institute. (2008). *A guide to the project management body of knowledge (PMBOK® Guide)-2008.* 4th ed. Newtown Square, PA: Project Management Institute

Prawitt, D., & Tysiac, K. (2013). Put COSO update to work. *Journal of Accountancy, 216(1),* 20. Retrieved from http://www.aicpa.org

Pye, V., Taylor, N., Clay-Williams, R., & Braithwaite, J. (2016). When enough is enough. Understanding and solving your sample size problem in health services research. *BMC Research Notes, 9,* 1-7. doi: 10.1186/s13104-016-1893-x

Quaresma, A., Pereira, R., Dias, A. (2013). Corporate governance practices in listed banks – impact on risk management and resulting financial performance. *Proceeding of the Northeast Business & Economics Association, 2013,* 197-200. Retrieved from http://www.nbea.us

Quinino, R., Reis, E., & Bessegato, L. (2013). Using the coefficient of determination R2 to test the significance of multiple linear regression. *Teaching Statistics. 35*(2), 84-88. doi:10.1111/j.1467-9639.2012.00525.x

Rajendran, M. (2012). Operational risks involved in banking industries. *Amity Global Business Review*, 7, 50-56. Retrieved from http://www.amity.edu

Reitz, O., & Anderson, M. (2013). A comparison of survey methods in studies of the nurse workforce. *Nurse Researcher, 20*(4), 22-27. doi:10.7748/nr2013.03.20.4.22e286

Research Information Limited. (2012). Document & system security. *Document News, 30*(1), 11-14. Retrieved from http://www.researchinformation.co.uk

Resnik, D., Miller, A., Kwok, R., Engel, S., & Sandler, D. (2015). Ethical issues in environmental health research related to public health emergencies: Reflections on the Gulf study. (2015). Environmental Health Perspectives, 123, A227-A231. doi:10.1289/ehp.1509889

Rhodes, L., & Dawson, R. (2013). Lessons learnt from lessons learnt. *Knowledge & Process management, 20,* 154-160. doi:10.1002/kpm.1415

Rittenberg, L., & Martens, F. (2012). Understanding and communicating risk appetite. Retrieved from http://www.coso.org

Roberts, N., & Grover, V. (2012). Leveraging information technology infrastructure to facilitate a firm's customer agility and competitive activity: An empirical investigation. *Journal of Management Information Systems, 28*(4), 231–269. doi:10.2753/MIS0742-1222280409

Robu, M. (2015). Study on increasing value relevance of accounting information by IFRS. *Audit Financiar, 13*(123), 100-110. Retrieved from http://www.revista.cafr.ro

Rocha-Pereira, H. (2012). Rigour in phenomenological research: reflections of a novice nurse researcher. *Nurse Researcher*, *19*(3), 16-19. doi:10.7748/nr2012.04.19.3.16.c9054

Roda, C., Nicolis, I., Momas, I., & Guihenneuc, C. (2014). New insights into handling missing values in environmental epidemiological studies. *Plos One*, *9*(9), 1-8. doi:10.1371/journal.pone.104254

Rodriguez, A. (2013). The Latino assumption: A research note. *Leisure Sciences, 35*, 184-189. doi:10.1080/01490400.2013.761917

Rothstein, M. (2015). Ethical Issues in big data health research. *Journal of Law, Medicine & Ethics, 43*,425-429. doi:10.1111/jlme.12258

Roy, A., Vyas, V., & Jain, P. (2013). SMEs motivation: Corporate social responsibility. *SCMS Journal of Indian Management, 10*(1), 11-21. Retrieved from http://www.scmsgroup.org

Saffer, J. (2014). *Owner-Manager separation and the structure of IT governance in small business* (Doctoral Dissertation). Retrieved from Proquest Dissertations and Theses Database. (UMI 3630523)

Salierno, D. (2014). COSO to update ERM framework. *Internal Auditor, 71*(6), 17. Retrieved from http://www.theiia.org

Sanjari, M., Bahramnezhad, F., Fomani, F., Shoghi, M., & Cheraghi, M. (2014). Ethical challenges of researchers in qualitative studies: The necessity to develop a specific guidelines. *Journal of Medical Ethics & History of Medicine, 7*(4), 1-6. Retrieved from http://www.tums.ac.ir

Scott, S., & Orlikowski, W. (2014). Entanglements in practice: Preforming anonymity through social media. *MIS Quarterly, 38,* 873-893. Retrieved from http://www.misq.org

Shah, S., & Dubay, S. (2013). Market orientation and organizational performance of financial institutions in United Arab Emirates. *Journal of Management & Public Policy, 4*(2), 17-26. Retrieved from http://www.mdrfindia.org

Shan, H., Hu, E., Wang, L., & Liu, G. (2014). Study on antecedent variable of dual commitment in the transitional economy. *Pakistan Journal of Statistics, 30*, 935-955. Retrieved from http://www.pakjs.com

Serek, R. (2013). Service Quality and Process Maturity Assessment. *Journal of Competitiveness, 5*(4), 43-56. Retrieved from http://www.cjournal.cz/index.php?hid=aktuaini

Serier, M., Benamara, N., Megueni, A., & Refassi, K. (2015). Modeling of cracked beams by the experimental design method. *Latin American Journal of Solids & Structures, 12*, 1641-1652. doi:10.1590/1679-78251403

Simsekler, M., Card, A., Ruggeri, K., Ward, J., & Clarkson, P. (2015). A comparison on the methods used to support risk identification for patient safety in one UK NHS foundation trust. *Clinical Risk, 21*, 34-46. doi:10.1177/1356262215580224

Simona-Iulia, C. (2014). Comparative study between traditional and enterprise risk management – a theoretical approach. *Annals of the University of Oradea, Economic Science Series, 23*(1), 276-282. Retrieved from http://anale.steconomiceuoradea.ro/en/

Stella, B., Aggrey, N., & Eseza, K. (2014). Firm size and rate of growth of Ugandan manufacturing firms. *Journal of Applied Economics & Business Research, 4*, 178-184. Retrieved from http://www.aebrjournal.org

Strandholm, K., Schatzel, K., & Callahan, T. (2013). Inducing employees to leave: A comparison of four severance options. *Human Resource Management, 52*, 243–262. doi:10.1002/hrm.21526

SurveyMonkey. (2015). How it works. Retrieved from http://www.surveymonkey.com

Svatá, V. (2013). System view of business continuity management. *Journal of Systems Integration, 4*(2), 19-35. Retrieved from http://www.cssi.cz

Svatá, V. & Fleischmann, M. (2011). IS/IT Risk Management in banking industry. *Acta Oeconomica Pragensia, 19*, 42-60. Retrieved from http://www.vse.cz/aop/

Tabachnick, B., & Fidell, L. (2013). *Using multivariate statistics* (6th ed.). Boston, MA:Pearson Education.

Tai, L. (2015). The impact of corporate governance on the efficiency and financial performance of GCC National banks. *Middle East Journal of Business, 10*(1), 12-16. Retrieved from http://www.mejb.com/

Tan, C., Benbasat, I., & Cenfetelli, R. (2013). IT-mediated customer service content and delivery in electronic governments: An empirical investigation of the antecedents

of service quality. *MIS Quarterly*, *37*, 77-109. Retrieved from http://www.misq.org

Taylor, J., & Bates, T. (2013). A discussion on the significance associated with Pearson's correlation in precision agriculture studies. *Precision Agriculture*, *14*, 558-564. doi:10.1007/s11119-013-9314-9

Tchatoka, F. (2015). On bootstrap validity for specification tests with weak instruments. *Econometrics Journal*, *18*, 137–146. doi: 10.1111/ectj.12042

Teilans, A., Romanovs, A., Merkuryer, Y., Kleins, A., Dorogovs, P., & Krastas, O. (2011). Functional modelling of IT risks assessment support system. *Economics & Management*, *16*, 1061-1068. Retrieved from https://www.researchgate.net

Temel, T. (2013). Family size, human capital and growth: Structural path analysis of Rwanda. *Journal of Economic Development*, *38*(4), 39-73. Retrieved from http://www.jed.or.kr

The Institute of Risk Management. (2015). Risk appetite and tolerance. Retrieved from http://www.theirm.org

Thomas, S., & Bhasi, M. (2011). A structural model for software project risk management. *Vilakshan:The XIMB Journal of Management, 7*(3), 71-84. Retrieved from http://www.ximb.ac.in/

Tisone, C., Guerra, S., Lu, W., Mckyer, E., Ory, M., Dowdy, D., Wand, S., Miao, J., Evans, A., & Hoelscher, D. (2014). Food-shopping environment disparities in Texas WIC vendors: A pilot study. *American Journal of Health Behavior, 38*, 726-736. doi:10.5993/ajhb.38.5.10

Tohidi, H. (2011). The role of risk management in It systems of organization. *Procedia Computer Science, 3,* 881-887. doi:10.1016/j.procs.2010.12.144

Tokle, R., & Tokle, J. (2015). Caribou Mountain Credit Union: Back to the future. *Journal of Case Studies, 33,* 60-66. Retrieved from http://www.sfcrjcs.org

Tonn, B., & Steiefel, D. (2013). Evaluating methods for estimating existential risks. *Risk Analysis: An International Journal, 33,* 1772-1787. doi:10.1111/risa.12039

Trafimow, D. (2014). Considering qualitative and quantitative issues together. *Qualitative Research in Psychology, 11,* 15-24. doi: 10.1080/14780887.2012.743202

Trawinski, B., Smetek, M., Telec, Z., & Lasota, T. (2012). Nonparametric statistical analysis for multiple comparison of machine learning regression algorithms. *International Journal of Applied Mathematics & Computer Science, 22,* 867-881. doi:10.2478/v10006-012-0064-z

Truong, H., Grasso, M., Chen, Y., Kellogg, T., Robertson, T., Curotto, A., McFarland, W. (2013). Balancing theory and practice in respondent-driven sampling: A case study of innovations developed to overcome recruitment challenges. *PLoS ONE, 8*(8), 1-7. doi:10.1371/journal.pone.0070344

United States Department of Health & Human Services. (2015). Belmont Report 1979. Retrieved from http:// www.hhs.gov

Vaidean, V. (2014). On financial performance and capital structure of Romanian companies. *Finance: Challenges of the Future, 16,* 151-157. Retrieved from http://financejournal.ro

Vanclay, F., Baines, J. T., & Taylor, C. N. (2013). Principles for ethical research involving humans: Ethical professional practice in impact assessment, Part I. *Impact Assessment and Project Appraisal*, *31*, 243-253. doi:10.1080/14615517.2013.850307

Vandervelde, S., Brazel, J., Jones, K., & Walker, P. (2012). Comments by the Auditing Standard Committee of the auditing sections of American Accounting Association on public exposure draft: Internal control – integrated framework (COSO Framework). *Current Issues in Auditing*, *6*(1), C35-C42. doi:10.2305/ciia-50180

Veale, J. (2014). Edinburg Handedness Inventory- short form: A revised version on confirmatory factor analysis. *Laterality, 19*, 164-177. doi:10.1080/1357650X.2013.783045

Venkatesh, V., Brown, S., & Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *MIS Quarterly, 37*, 21-54. Retrieved http://www.misq.org

Vindras, P., Desmurget, M., & Baraduc, P. (2012). When one size does not fit all: A simple statistical method to deal with across-individual variations of effects. *Plos One, 7*(6), 1-15. doi:10.1371/journal.pone.0039059

Wan-Jiun, P., Porter, R., & Sopranzetti, B. (2014).Understanding the channels of bank value creation during time of crisis: Deconstructing ROA. *Journal of Accounting & Finance, 14*(5), 11-23. Retrieved from http://www.na-businesspress.com

Wang, D., Qu, Z., & Yuan, H. (2014). College students physical health evaluation index correlation research based on SPSS statistics analysis. *Journal of Chemical & Pharmaceutical Research, 6*(1), 122-128. Retrieved from http://jocpr.com

Wang, C., & Wang, S. (2014). Use behavior research of information security technology based on TAM. *International Journal of Security & its Application, 8*(2)203-209. doi:10.14257/ijsia.2014.8.2.21

White, J. (2014). How to use COSO to assess IT controls. *Journal of Accountancy, 217*(5), 34-37. Retrieved from http://www.journalofaccountancy.com/

Wieczorek-Kosmala, M. (2014). Risk management practices from risk maturity models perspective. *Journal for East European Management Studies, 19*, 133-159. doi:10.1688/JEEMS-2014-02-Wieczorek-Kosmala

Wilholt, T. (2013). Epistemic trust on science. *Bristish Journal for the Philosophy of Science, 64*, 233-253. doi:10.1093/bjps/axs007

Williams, B., & Brown, T. (2013). A confirmatory factor analysis of the self-directed learning readiness scale. *Nursing and Health Sciences, 15*, 430-436. doi:10.111/nhs.12046

Wisdom, J., Cavaleri, M., Onwuegbuzie, A., & Green, C. (2012). Methodological reporting in qualitative, quantitative, and mixed methods health services research articles. *Health Services Research, 47*, 721-745. doi:10.1111/j.1475-6773.2011.01344.x

Wu, J., & Cheung, H. (2014). Confirmatory factor analysis of Dospert scale with Chinese university students. *Psychological Reports: Mental & Physical Health, 114*(1), 185-197.doi:10.2466/09.03.pro.114k15w2

Wurst, J., Neter, J., & Godfrey, J. (1991). Effectiveness of rectification in audit sampling. *The Accounting Review, 66,* 333-346. Retrieved from http://aaajournals.org/

Ye, X., Yao, Z., Liu, W., Fan, Y., Xu, Y., & Chen, S. (2014). Path analysis to identify factors influencing health skills and behaviour in adolescents: A cross-sectional survey. *Plos One, 9*(8), e104406. doi:10.1371/journal.pone.0104406

Yesil, R. (2012). Validity and reliability studies on the scale of the reasons for academic procrastination. *Education, 133,* 259-274. Retrieved from http://www.projectinnovation.biz/index.html

Zainodin, H., & Yap, S. (2013). Overcoming multicollinearity in multiple regression using correlation coefficient. *AIP Conference Proceeding, 1557*, 416-419. doi:101063/1.4823947

Zafar, M., Bhattacharya, P., Ganguly, N., Gummachi, K., & Ghosh, S. (2015). Sampling content from online social network: Comparing random verses expert sampling of the twitter stream. *ACM Transaction on the Web, 9,* 12.1-12.33. doi:10.1145/2743023

Appendix A: Letter for Participation in Survey

To:

From:

Date:

Dear Sir/Madam:

I am Shaun Barrett, a Doctor of Business Administration student at Walden University specializing in Information Systems. I am seeking permission for staff members who are executives, department managers, branch managers, supervisors, internal audit officers, information technology officers, and risk officers to participate in the quantitative study on the relationship between information technology (IT) risk management, institution size, and financial performance of the institution. The population for the study is credit unions in Jamaica, West Indies. Participants in this study will be randomly selected from all participating credit unions after obtaining a list of staff members in the stated position at each institution. The name of your credit union will not be required.

I will use ISACA's Risk IT framework to examine key IT risk management initiatives at your credit union. The survey will be web-based. I will use SurveyMonkey to collect the data. The web-based survey may require 20 minutes of the respondent's time.

Maintaining confidentiality of the survey responses is critical, and so an encrypted USB drive in a safety deposit box will contain the data for 5 years after the completion of the

study. The responses to the electronic survey are crucial in helping to design appropriate IT risk management strategies for credit unions in Jamaica. Staff members may opt to withdraw from the research at their convenience, and upon request I will destroy the data provided by the staff members.

The doctoral study chairperson for this proposed study is Dr. Scott Burrus. If you have questions, you may contact myself or my supervising faculty member using the contact information. Shaun Barrett| P. O. Box 5879, Kingston 6| Mobile Phone: 876-579-8118| E-mail: shaun.barrett@waldenu.edu, Dr. Scott Burrus| E-mail: scott.burrus@waldenu.edu.

Your response and time are greatly appreciated. Thank you.

Sincerely,

Shaun Barrett

Appendix B: Consent Form

You are invited to participate in a research study designed to understand the relationship between IT risk management, institution size, and the institution's financial performance. This form is part of a process called "informed consent" to allow you to understand this study before you decide on whether to participate. The study is being conducted by a researcher named Shaun Barrett, who is a Doctor of Business Administration student at Walden University. You were selected as a possible candidate for the study because you are either a credit union executive, manager, supervisor, IT employee, risk employee or audit employee and agreed to participate in the proposed study.

Background Information:

The purpose of this study is to determine whether a relationship exists between IT risk management measured using a web-based survey, institution size measured by asset in dollars, and financial performance measured by the institution's return on asset (ROA). The study will use ISACA's Risk IT framework to examine key IT risk management initiatives at your credit union. Independent audited financial statements will contain information for your credit union size and financial performance.

Procedures:

If you agree to be a participant in this study, your response to the web-based survey is vital. The estimated time required to complete the web-based survey is 20 minutes. The responses will remain confidential and not shared with anyone else.

Voluntary Nature of the Study:

Your participation in this study is voluntary. Voluntary participation means that everyone will respect your decision of whether or not you want to be in the study. If you decide to join the study now, you can still change your mind during the study. You may discontinue participation at any time.

Risks and Benefits of Being in the Study:

The data for this study is confidential. Thus, no personal risk associated with participating in the study or a negative impact on your standing in your credit union exists. The benefits of the study include providing information that may assist credit union leaders in making decisions relating to technology expenditure and IT resource allocation.

Compensation:

There will be no compensation provided for your participation in this study.

Confidentiality:

Any information you provide is confidential. Your identity as well as any information that may link your responses to your credit union and your job title will be known only by me. I will not use your information for any purpose outside of this study. Equally, the study will not contain your name or anything else that could identify you. I will store the electronic data on a secure USB drive in a locked drawer at my residence during the data collection phase. I will be the only individual with access to the locked drawer. After the completion of the study, I will store the USB drive in a safety deposit box at a financial institution for 5 years. Data destruction will occur 5 years following the completion of the study.

Contacts and Questions:

My name is Shaun Barrett and I will conduct the research. My doctoral study chairperson is Dr. Scott Burrus. If you have questions, you may contact myself, my supervising faculty member, or Walden University research participant advocate using the contact information below.

Shaun Barrett| P. O. Box 5879, Kingston 6| Mobile Phone: 876-579-8118| E-mail: shaun.barrett@waldenu.edu, Dr. Scott Burrus| E-mail: scott.burrus@waldenu.edu, or Research Participant Advocate| Phone: 1-800-925-3368 ext. 312-1210 from within the USA | Phone: 001-612-312-1210 from outside the USA | E-mail: irb@waldenu.edu.

Please print and retain a copy of this form for your records.

Statement of Consent:

Tick the appropriate statement.

( ) I am employed at the credit union in Jamaica in the positions of executives, department manager, branch managers, supervisors, internal audit staffs, information technology staffs, or risk staffs.

( ) I am over the age of 18.

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By clicking the link to the electronic survey, I am agreeing to the terms described above.

Click the link to go to the survey: https://www.surveymonkey.com

Appendix C: Survey Questions

Introduction

This survey will address the degree to which your organization follows and utilizes IT risk management practices and processes recommended by ISACA Risk IT framework. The responses will be used to determine the level of IT risk management activities in your credit union and then will be analyzed as part of a larger effort to better understand relationship between IT risk management, institution size and financial performance in credit unions in Jamaica. The survey will address process areas within risk governance, risk evaluation, and risk response.

This survey is divided into four sections, with the later three sections corresponding to these aforementioned process areas. For each statement on the following pages, please provide a response on a scale of 0 to 5. The definition of the scale is stated below.

0 - Processes are non-existent *when*

The enterprise does not recognize the need to consider the business impact of IT risk. There is no awareness of external requirements for IT risk management and integration with enterprise risk management.

1 - Processes are at an initial stage *when*

There is an emerging understanding that IT risk is important, and management of these risks is essential but viewed as a technical issue. The business primarily considers the downside of IT risk.

2 - Processes are repeatable *when*

There is an awareness of the need to manage IT risk actively, but the focus is on technical compliance. There are emerging leaders for IT risk management within silos who assume responsibility and accountability, but there may not be any formal agreement. Risk tolerance is within these silos.

3 - Processes are defined *when*

IT risk management is a business issue. There is a designated leader for IT risk across the enterprise; this leader engages with the enterprise risk committee, where IT risk is in scope and discussed. The business understands how IT fits into the enterprise risk universe and the risk portfolio view. Enterprise risk tolerance germinates from local tolerances and IT risk management activities align across the enterprise. Formal risk categories are present and described in clear terms.

4 - Processes are managed *when*

IT risk management is a business enabler, and both the downside and upside of IT risk communicated. The designated leader for IT risk across the enterprise engages fully with the enterprise risk committee, which expects value from including IT in decisions. The board defines risk appetite and tolerance across the risk universe, including IT risk. Enterprise policies and standards reflect business risk tolerance.

5 - Processes are optimized *when*

Senior executives make a point of considering all aspects of IT risk in their decisions.

The IT department is a major player in business line operational risk efforts and enterprise risk efforts. Strategic objectives arise from an executive-level understanding of

IT-related business threats, risk scenarios, and competitive opportunities. Enterprise policies and standards continue to reflect business risk tolerance while increasing efficiency.

The grade selected should reflect the degree to which you believe or understand your organization has complied with or satisfied the objectives or processes as stated. Please use the next page button on the bottom of each page to navigate through the survey. You can use the previous page button to revisit an earlier page if necessary. Please select the appropriate option.

1. I am

   () Under the age of 18 years

   () 18 years or older

2. I am currently employed at the credit union as

   () Executive

   () Department or branch manager

   () Supervisor

   () Internal audit staff

   () Risk management staff

   () Information technology staff

3. The asset of my credit union in dollars (JMD) is

   () Less than $300 million dollars

   () Greater than $300 million dollars but less than $1 billion dollars

   () $1 billion dollars to $2 billion dollars

() Greater than $2 billion dollars

RISK GOVERNANCE

The purpose of Risk Governance is to identify IT risk governance initiatives adapted by your institution.

4. Perform enterprise IT risk assessment
    () Processes are non-existent
    () Processes are at an initial stage
    () Processes are repeatable
    () Processes are defined
    () Processes are managed
    () Processes are optimized
5. Propose IT risk tolerance threshold
    () Processes are non-existent
    () Processes are at an initial stage
    () Processes are repeatable
    () Processes are defined
    () Processes are managed
    () Processes are optimized
6. Approve IT risk tolerance threshold
    () Processes are non-existent
    () Processes are at an initial stage
    () Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

7. Align IT risk policy

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

8. Promote IT risk aware culture

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

9. Encourage effective communication of IT risk

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

10. Establish and manage accountability for IT risk management

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

11. Coordinate IT risk strategy and business risk strategy

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

12. Adapt IT risk practices to enterprise risk practices

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

13. Provide adequate resource for IT risk management

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

14. Provide independent assurance over IT risk management

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

15. Gain management buy-in for IT risk approach

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

Approved IT risk analysis

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

16. Embedded IT considerations in strategic decision making

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

17. Accept IT risk

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

18. Prioritize IT risk response

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

RISK EVALAUTION

The purpose of Risk Evaluation is to identify IT risk evaluation initiative adapted by your institution.

19. Establish and maintain a model for data collection

    () Processes are non-existent

    () Processes are at an initial stage

    () Processes are repeatable

    () Processes are defined

    () Processes are managed

    () Processes are optimized

20. Collect data on the operating environment

    () Processes are non-existent

    () Processes are at an initial stage

    () Processes are repeatable

    () Processes are defined

    () Processes are managed

() Processes are optimized

21. Collect data on the risk events

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

22. Identify risk factors

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

23. Identify IT risk analysis scope

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

24. Estimate IT risk

    () Processes are non-existent

    () Processes are at an initial stage

    () Processes are repeatable

    () Processes are defined

    () Processes are managed

    () Processes are optimized

25. Identify IT risk response options

    () Processes are non-existent

    () Processes are at an initial stage

    () Processes are repeatable

    () Processes are defined

    () Processes are managed

    () Processes are optimized

26. Perform peer review of IT risk analysis

    () Processes are non-existent

    () Processes are at an initial stage

    () Processes are repeatable

    () Processes are defined

    () Processes are managed

    () Processes are optimized

27. Map resource to business process

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

28. Determine business criticability of IT resources

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

29. Understand IT capability

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

30. Update IT risk scenario components

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

31. Maintain IT risk register and IT risk map

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

32. Develop IT risk indicators

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

RISK RESPONSE

The purpose of Risk Response is to identify IT risk responses at your institution.

33. Communicate IT risk analysis results

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

34. Report IT risk management activities and state of compliance

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

35. Interpret independent IT assessment findings

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

36. Identify IT related opportunities

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

37. Maintain IT inventory controls

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

38. Monitor operational alignment with risk tolerance threshold

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

39. Respond to risk exposure and opportunity

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

40. Implement controls

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

41. Report IT risk action plan progress

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

42. Maintain incidents response plan

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

43. Monitor IT risk

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

44. Initiate incident response

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

45. Communicate lessons learnt from incidents

() Processes are non-existent

() Processes are at an initial stage

() Processes are repeatable

() Processes are defined

() Processes are managed

() Processes are optimized

Appendix D: Permission for Risk IT Framework

ISACA
Trust in, and value from, information systems

3701 Algonquin Road, Suite 1010
Rolling Meadows, Illinois 60008-3105, USA
Web Site: www.isaca.org

Telephone: +1.847.253.1545
Facsimile: +1.847.253.1443
E-mail: info@isaca.org

October 14, 2015

Shaun Barrett
shaun.barrett@waldenu.edu

Dear Shaun:

Thank you for expressing interest in using *Risk IT Framework for Management of IT Related Business Risks* and *IT Risk Management Audit/Assurance Program* ("Works") as part of your doctoral work. Permission is granted through 2016 subject to the following limitations:

1. Permitted use is limited solely to using the Works in for non-commercial purposes specific to your academic pursuits.
2. This permission does not include the right to grant others permission to photocopy or otherwise use, reproduce, redistribute, sell or translate the Work.
3. You may not sell the Works alone or as embedded into another document or software program.
4. Appropriate credit must appear anywhere the content appears: "Source: *Risk IT Framework for Management of IT Related Business Risks* ©2009 ISACA®. All rights reserved. Used by permission or IT Risk Management Audit/Assurance Program 2012 ISACA®. All rights reserved. Used by permission.
5. This permission may be revoked at any time but will in any case expire on December 31, 2016.
6. Should any of the above limitations be breached, this permission is automatically be revoked as of the date of the breach.

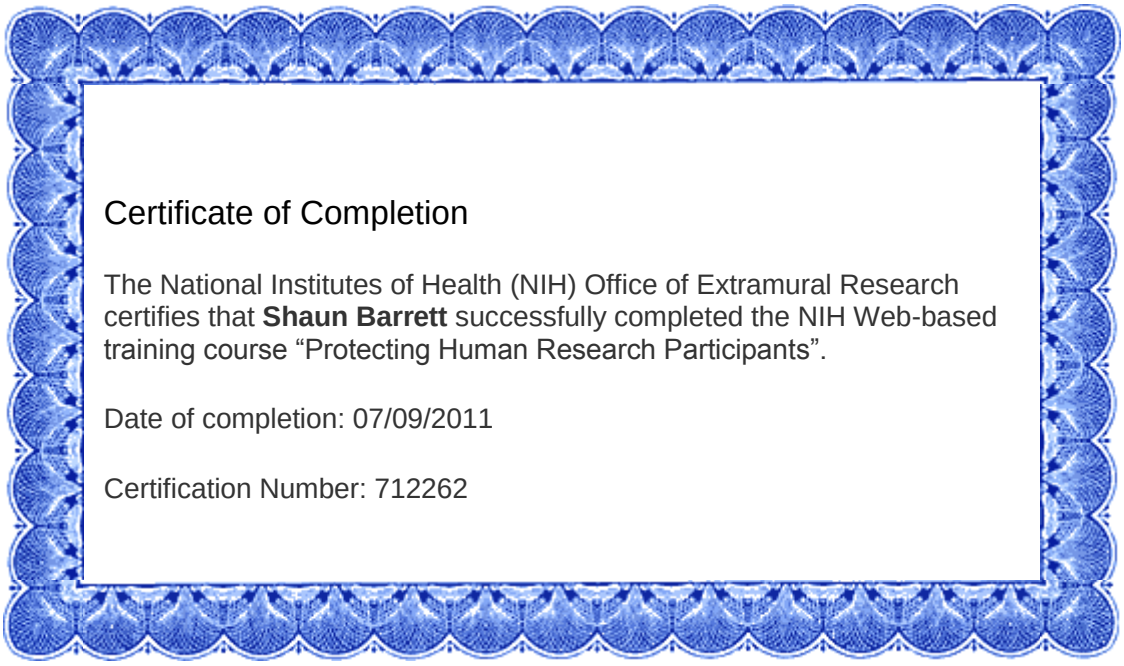
If you have any questions regarding permissions, please call me at 847.660.5506 or contact me by e-mail at prandall@isaca.org.

We appreciate your support of ISACA.

Sincerely,

Pam Randall
Sr. Legal Coordinator
ISACA/ITGI

Appendix E: NIH Certificate



Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Shaun Barrett** successfully completed the NIH Web-based training course “Protecting Human Research Participants”.

Date of completion: 07/09/2011

Certification Number: 712262

Appendix F: SPSS Output

Model Summary

Model	R	R Square	Adjusted R Square Management	Estimated Error of the Estimate
1	.697	.486	.476	2.23461

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	467.997	2	233.998	46.861	.000
	Residuals	494.356	99	4.993		
	Total	952.353	101			

a. Dependent Variable: Average ROA

b. Predictors: (Constant), Institution size, IT risk management

Coefficients

Model	Unstandardized Coefficient		Standardized Coefficient	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	7.788	1.006		7.741	.000
Risk ITScore	.291	.161	.139	1.807	.074
Size	-2.588	.312	-.637	-8.300	.000

Boot Strap for Coefficients

Model		B	Bias	Std. Error	Sig. (2 tailed)	95% Confidence Interval	
						Lower	Upper
1	(Constant)	7.788	-.512	2.654	.043	1.183	11.875
	Risk IT Score	.291	.026	.165	.119	-.002	.634
Size		-2,588	.164	.859	.041	-3.924	-.433

a. Unless otherwise noted, bootstrap results are based on 2000 bootstrap samples