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The Influence of Irrelevant Information on IS Auditor Key Risk Factor Predictions

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Can information systems (IS) auditors ignore irrelevant information when they assess key risk factors (KRFs)? Irrelevant information is information that is of little or no value to a specific task or predicted future outcome.[1] When assessing a KRF, IS auditors sift through numerous pieces of information to target items that are relevant to understanding the KRF.[2] Some items encountered by IS auditors may be relevant to understanding the KRF, while other items encountered may be irrelevant. IS auditors should ignore irrelevant information when they assess KRFs.

An example of irrelevant information that an IS auditor may encounter during a financial statement audit is obsolete code that was written for an application that was replaced in a previous audit period—the data that were saved in the prior application have been saved in the new application. Although IS auditors are aware that the old code is irrelevant, the old code may still influence IS auditors' KRF assessments. Irrelevant information may influence IS auditors to reduce their assessments of KRFs when higher assessments would be more appropriate. If IS auditors were exposed to irrelevant information during a financial statement audit and decreased their assessment of KRFs, too few resources may be allocated toward gaining a better understanding of the KRFs. As a result, audit failure[3] could occur.

Thirty-seven IS auditors participated in a repeated-trial experiment in which they all read the same case and responded to the same questions about a multinational, publicly traded bank that provided e-banking services. During the experiment, the participants rated the effectiveness of e-banking KRFs, estimated the risk of material misstatement for e-banking KRFs and suggested revisions to the audit plan for e-banking services KRFs. The participants also completed a knowledge test and provided information about their backgrounds.

The change in the IS auditors' KRF assessments when irrelevant information is present vs. when the irrelevant information is not present is the dependent variable in this study. The results of this study reveal that IS auditors' KRF assessments are significantly lower when irrelevant information is present vs. when irrelevant information is not present. This study also presents evidence that knowledge of automated controls can help mitigate the effects of irrelevant information on IS auditors' KRF assessments.

HYPOTHESES

Individuals have been found to lower their predictions of future event outcomes when they are exposed to irrelevant information. The literature that describes this phenomenon explains that individuals dilute their predictions by unintentionally overlapping characteristics of irrelevant information with relevant information characteristics.[4] While individuals attend to and unintentionally overlap the characteristics of irrelevant and relevant information, they eventually become distracted by the saliency of the irrelevant information. The result is the failure of individuals to focus their attention exclusively on information that is relevant to the task. The unintentional deemphasis of relevant information causes the individuals to reduce their predictions of future event outcomes. Thus, it is predicted that IS auditors will provide lower KRF predictions when irrelevant information is present. The hypotheses, stated in the alternative form, are:
- Hypothesis 1: Irrelevant information will influence IS auditors to reduce their effectiveness ratings of e-banking KRFs.
- Hypothesis 2: Irrelevant information will influence IS auditors to reduce their likelihood estimates of the risk of material misstatement for e-banking KRFs.

- Hypothesis 3: Irrelevant information will influence IS auditors to reduce their audit plan revisions relative to the prior year's audit.

RESEARCH METHOD

This section details the research method for the experiment.

Pretesting

The KRFs and irrelevant information in this experiment were developed with the assistance of two Certified Information Systems Auditors (CISAs) who were senior assurance managers with two separate Big Four accounting firms. The two CISAs provided feedback that was used to revise the wording of the KRFs and irrelevant information items.

To distinguish the KRFs from the irrelevant information items in this experiment, the KRFs and irrelevant information items underwent a second round of pretesting with four seasoned IS auditors.[5] The IS auditors in the second round of pretesting had an average of 64.75 months of experience as IS auditors and had worked on an average of 22.75 client engagements. The pretest group had an average of 15 more months of experience than the average experimental participant.

The pretest IS auditors rated the relevance of each KRF and each piece of irrelevant information individually (1 [low relevance] to 100 [high relevance]). Pretest results revealed that the pretest IS auditors' average pretest relevance rating for the KRFs was 85 and their average pretest relevance rating for the irrelevant information items was 11.23. The pretest IS auditors distinguished the KRFs from the irrelevant pieces of information by rating the KRFs to be seven times more relevant than the irrelevant information items used in this study.

Experimental Participants

The emphasis of this study was to identify how IS auditors are influenced by irrelevant information when they assess KRFs. The merits of this study were discussed with senior management at international accounting firms during the study's proposal stage. The members of senior management at the international accounting firms were interested in the results of the study, and because of their interest, they agreed to allow their IS auditors to volunteer and participate in this study. The IS auditors who participated in this study volunteered of their own will, were not selected by the researcher based on any selective criteria and were not forced to participate by their employing firms. Thus, the backgrounds of the IS auditors in this study may be similar to the backgrounds possessed by the population of IS auditors who assess KRFs.

Thirty-seven IS auditors participated in this study. Descriptive data on the participants in the study are provided in **figure 1**.

Figure 1—Participant Demographics	
	Mean (Standard Deviation) N = 37
Average months of experience	49.43 (39.66)
Average number of engagements	20.76 (26.82)
Average number of IS training courses taken as a professional	7.92 (8.14)
Average number of IS training courses taken while pursuing an undergraduate degree	2.95 (3.64)

Case Material

Participants' KRF predictions were captured using a computer program that was designed by the researcher according to the Tailored Design Method.[6] The program controlled effects by randomizing the presentation order of the information pieces. The program also controlled the order in which the participants completed the tasks in the experiment. The program saved participants' responses when they chose to proceed to the next page, and it did not allow participants to modify their saved responses on a page once they moved to the next page. Participants were not subject to any time pressure and took an average of 38.15 minutes to complete the tasks.

Participants were informed of the experiment by their respective employing firms and given the option to volunteer. Before participants were granted access to the computer

program, they read an overview that summarized the purpose of the study. The participants were then given the option to continue (97 percent of the participants continued and completed the study). Those who chose to continue were then assigned a password and a personal identification number (PIN). Participants used their passwords to enter the experiment, and after reading the general instructions, the participants entered their PINs and provided their formal consent to participate in the study. Half of the participants were randomly assigned to the automated-control KRF initially and then to the manual-process KRF. The other half of the participants were assigned to the manual-process KRF initially and then to the automated-control KRF.

The design of the experiment is a repeated trial in which each participant is exposed to every experimental condition (or phase) in the study. In the first trial of this experiment, each participant assessed effectiveness, risk material misstatement and audit plan adjustments with irrelevant information. For the next trial, the irrelevant information was removed from the experimental condition. This design exposed the effects of the irrelevant information on IS auditors' KRF assessments and allowed for the direct measurement of the influence of irrelevant information.

An automated-control KRF was evaluated in two phases of the experiment. A manual-process KRF was also evaluated, but in two different phases of the experiment. In phases one and two, participants were given four irrelevant items and one KRF for automated-control items (or manual-process items, depending on the participant group). During phase one, participants were asked to provide their KRF predictions after reading four irrelevant automated-control items (or manual-process items) with the automated-control KRF (or manual-process KRF). During phase two, participants were asked to provide their KRF predictions based solely on the automated-control KRF (or manual-process KRF). Participants then repeated these steps during phases three and four for manual-process KRFs (or automated-control KRFs).

Three dependent variables were captured and tested for each phase of the experiment. Participants rated the effectiveness of e-banking KRFs using a seven-point Likert scale, -3 (extremely effective) to +3 (extremely ineffective). Participants predicted the risk of material misstatement[7] for e-banking KRFs by estimating likelihood probabilities between 0 and 100. Participants rated the audit plan revisions

relative to the prior year's audit using an 11-point Likert scale, 0 (significantly decrease) to 10 (significantly increase).

ANALYSIS AND RESULTS

Figure 2 provides the statistics for the automated-control e-banking KRF (panel A) and the manual-process e-banking KRF (panel B). The means and standard deviations—with irrelevant information and without irrelevant information—are provided for both panels. The result of each risk prediction is discussed following the figure.

As shown in panel A, the mean response and the standard deviation of the participants' ratings of the effectiveness of the automated-control e-banking KRF with irrelevant

Figure 2—Descriptive Statistics		
Panel A: Automated-control E-banking KRF		
	Mean (Standard Deviation)	
Risk Prediction	**With Irrelevant Information**	**Without Irrelevant Information**
Effectiveness	-0.3 (1.27)	0.97 (1.19)
Risk of material misstatement	43.19 (27.54)	57.7 (27.22)
Audit plan adjustments	7.86 (1.32)	8.46 (1.41)
Panel B: Manual-process E-banking KRF		
	Mean (Standard Deviation)	
Risk Prediction	**With Irrelevant Information**	**Without Irrelevant Information**
Effectiveness	0.76 (1.36)	1.73 (0.93)
Risk of material misstatement	50.41 (31.26)	65.14 (30.56)
Audit plan adjustments	8.11 (1.56)	8.51 (1.82)
Response scale: • Effectiveness: -3 (extremely effective) to +3 (extremely ineffective) • Risk of material misstatement: Likelihood probabilities between 0 and 100 • Audit plan adjustments: 0 (significantly decrease) to 10 (significantly increase)		

information was -0.3 and 1.27, respectively. The mean response and standard deviation of the automated-control e-banking KRF without irrelevant information was 0.97 and 1.19, respectively. Thus, the participants' prediction of the effectiveness of the automated-control e-banking KRF was almost "neutral" when irrelevant information was present. In contrast, when irrelevant information was not present, the participants provided higher risk predictions about the automated-control e-banking KRF and identified it to be "somewhat ineffective."

The mean response and standard deviation of the participants' estimates of the risk of material misstatement of the automated-control e-banking KRF with irrelevant information was 43.19 and 27.54, respectively. Without irrelevant information, the mean response and standard deviation was 57.7 and 27.22, respectively. Thus, the participants' estimates of the risk of material misstatement of the automated-control e-banking KRF were, on average, lower when irrelevant information was present.

The mean response and standard deviation of the participants' adjustments to the audit plan for the automated-control e-banking KRF with irrelevant information was 7.86 and 1.32, respectively. Without irrelevant information, the mean response and standard deviation was 8.46 and 1.41, respectively. Thus, the participants' audit plan adjustments for the automated-control e-banking KRF were, on average, lower when irrelevant information was present.

As shown in **figure 2**, panel B, the mean response and standard deviation of the participants' ratings of the effectiveness of the manual-process e-banking KRF with irrelevant information was 0.76 and 1.36, respectively. The mean response and standard deviation of the participants' ratings of the effectiveness of the manual-process e-banking KRF without irrelevant information was 1.73 and 0.93, respectively. Thus, the participants' predictions of the effectiveness of the manual-process e-banking KRF were closer to "somewhat ineffective" when irrelevant information was present. In contrast, when irrelevant information was not present, the participants provided higher risk predictions about the manual-process e-banking KRF by identifying the KRF to be "ineffective."

The mean response and standard deviation of the participants' estimates of the risk of material misstatement of the manual-process e-banking KRF with irrelevant

information was 50.41 and 31.26, respectively. The mean response and standard deviation without irrelevant information was 65.14 and 30.56, respectively. Thus, the participants' estimates of the risk of material misstatement of the manual-process e-banking KRF were, on average, lower when irrelevant information was present.

The mean response and standard deviation of the participants' adjustments to the audit plan for the manual-process e-banking KRF with irrelevant information was 8.11 and 1.56, respectively. The mean response and standard deviation without irrelevant information was 8.51 and 1.82, respectively. Thus, the participants' audit plan adjustments for the manual-process e-banking KRF were, on average, lower when irrelevant information was present.

The results for the test of the hypotheses are provided in **figure 3**. Hypothesis 1 predicts that irrelevant information will influence IS auditors to reduce their effectiveness ratings of e-banking KRFs. The results reported in **figure 3** suggest that the influence of irrelevant information is significant for the effective ratings of e-banking KRFs of automated controls (panel A, t-statistic = 6.473, p-value < 0.0001) and manual processes (panel B, t-statistic = 4.705, p-value < 0.0001). Thus, irrelevant information influences IS auditors to provide statistically lower effectiveness ratings for automated-control KRFs and manual-process KRFs.

Hypothesis 2 predicts that irrelevant information will influence IS auditors to reduce their estimates of the risk of material misstatement for e-banking KRFs. The results reported in **figure 3** suggest that the influence of irrelevant information is significant for the risk of material misstatement estimates of e-banking KRFs for automated controls (panel A, t = 3.948, p = 0.0002) and manual processes (panel B, t = 3.787, p < 0.0003). Thus, irrelevant information influences IS auditors to provide statistically lower estimates of the risk of material misstatements for automated-control KRFs and manual-process KRFs.

Hypothesis 3 predicts that irrelevant information will influence IS auditors to reduce their audit plan adjustments relative to the prior year's audit. The results reported in **figure 3** are slightly mixed. Irrelevant information has a significant influence on IS auditors' audit plan revisions for automated-control e-banking KRFs (t = 2.227, p = 0.0161). However, irrelevant information has only a marginal influence on IS auditors' audit plan adjustments for manual-process

Figure 3—Results of Statistical Tests					
Influence of Irrelevant Information KRF: With Irrelevant Information Minus Without Irrelevant Information Paired Samples Tests, One-tail					
Panel A: Automated-control KRF					
Risk Prediction	**Statistical Degrees of Freedom (df)**	**Mean Difference**	**Standard Deviation**	**t-statistic**	**Statistical Significance (sig.)**
Effectiveness	36	-1.27	1.19	6.473	< 0.0001
Risk of material misstatement	36	-14.51	22.36	3.948	0.0002
Audit plan adjustment	36	-0.60	1.62	2.227	0.0161
Panel B: Manual-process KRF					
Risk Prediction	**df**	**Mean Difference**	**Standard Deviation**	**t**	**sig.**
Effectiveness	36	-0.97	1.29	4.705	< 0.0001
Risk of material misstatement	36	-14.73	23.66	3.787	0.0003
Audit plan adjustment	36	-0.41	1.64	1.503	0.0708

e-banking KRFs (t = 1.503, p = 0.0708). Thus, irrelevant information influences IS auditors to provide statistically lower audit plan adjustments for automated-control KRFs when irrelevant information is present. In addition, IS auditors' plan adjustments for manual-process KRFs are marginally influenced by the presence of irrelevant information.

The influence of irrelevant information on human judgment is widely noted in psychology literature.[8] Consistent with that literature, the results of this study suggest that IS auditors can be influenced by irrelevant information when they assess KRFs. However, it may be more beneficial to identify areas in which the influence of irrelevant information on IS auditors may be resolved.

Participants' knowledge, test scores and background information were analyzed to identify potential areas in which the influence of irrelevant information on IS auditors could be mitigated. The participants' responses were ranked according to their automated-control knowledge scores, months of longevity as an IS auditor, and their number of IS audit engagements. For each of these categories, the participants were partitioned into one of two groups (high or low) and subjected to nonparametric statistical tests.[9] The additional analysis revealed that IS auditors with high automated-control knowledge were less influenced by irrelevant information than IS auditors with low automated-control knowledge. The probabilities that the high and low automated-control knowledge groups were not similar in their KRF predictions of effectiveness, risk of material misstatement and audit plan adjustments were statistically significant (0.009,

0.002 and 0.019, respectively). All of these probabilities are well below the 0.05 threshold to reject the null hypotheses that the high and low groups are similar. Thus, a high magnitude of automated-control knowledge may be what IS auditors need to overcome the influence of irrelevant information for automated-control KRFs. Neither months of longevity as an IS auditor nor the number of IS auditor engagements revealed any statistically significant differences.

The generalizability of the results in this experiment to other contexts is limited in the same fashion as all experiments are limited. An experiment cannot capture all facets of the real world. For example, the IS auditors in this experiment worked individually to complete the experimental case. IS auditors do work individually in the real world to assess KRFs, but they may also collaborate with other IS auditors to assess KRFs. The influence of irrelevant information on IS audit teams was not investigated in this study. Moreover, accountability has not been found to impact the influence of irrelevant information on financial statement auditors.[10] However, the effects of accountability on IS auditors are unknown and are was investigated in this study. Therefore, IS auditors may not be affected by irrelevant information when they collaborate with other IS auditors or when they are accountable to another member of the audit engagement team.

CONCLUSION
The results in **figure 3** indicate that irrelevant information influences the KRF predictions of IS auditors. The psychological

literature on the influence of irrelevant information suggests that the presence of irrelevant information reduces the prediction of future outcomes.[11] If IS auditors reduce their assessments of KRFs as a result of their exposure to irrelevant information, too few resources may be allocated to the evaluation of KRFs during financial statement audits. Subsequently, and most important, audit failure could occur.

The practical implication of this study is that IS auditors with high automated-control knowledge may be able to mitigate potential audit failure that occurs as a result of their exposure to irrelevant information. IS auditors with high knowledge scores in automated controls were not influenced by irrelevant information as much as IS auditors with low knowledge scores in automated controls.

Knowledge can be defined as the "fact or condition of being aware of something."[12] Thus, IS auditors may be able to minimize the effects of irrelevant information by increasing their awareness of the information that they will encounter when they assess KRFs. This means that IS auditors could increase their awareness of their clients' information environments by reading their clients' prior-period work papers, if they exist. If prior-period work papers do not exist, IS auditors should interview their clients to increase their awareness of their clients' information environments. If clients are not willing to discuss their information environments, IS auditors should perform a self-study and form their own expectations of the clients' information environments.

After having an idea of what to expect in a client's information environment, IS auditors should examine the step in the audit plan prior to performing that step. Next, the IS auditor should reconcile the step in the audit plan with the relevant information that the IS auditor plans to encounter. Last, IS auditors should ignore the information that is of little or no value to completing the step in the audit plan, while focusing on information that is relevant to completing the audit step.

ENDNOTES

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2. Singleton, Tommie W.; "Emerging Technical Standards on Financial Audits: How IT Auditors Gather Evidence to Evaluate Internal Controls," *Information Systems Audit and Control Journal*, vol. 4, 2007
3. Audit failure occurs when financial statements contain a material misstatement. The KRFs in this experiment could lead to material misstatements.
4. *Op cit*, Tetlock
5. Consistent with the methods used in prior studies of the influence of irrelevant information, the more seasoned pretest IS auditors rated the irrelevant information in the experiment to be irrelevant before the experiment could be given to experimental participants.
6. Dillman, Don A.; *Mail and Internet Surveys: The Tailored Design Method, 2nd Edition*, John Wiley & Sons, USA, 2007
7. The risk of material misstatement is the likelihood that a financial statement has a material misstatement.
8. *Op cit*, Tetlock
9. The Wilcoxon Rank Sum Test was used as the nonparametric statistical procedure because of the small sample size for the high and low groups.
10. Hoffman, Vicky B.; James M. Patton; "Accountability, the Dilution Effect and Conservatism in Auditors' Fraud Judgments," *Journal of Accounting Research*, vol. 35, no. 2, autumn 1997
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12. Merriam-Webster, *www.merriam-webster.com/dictionary/knowledge*