# UNIVERSITY OF NAIROBI
## SECOND SEMESTER EXAMINATIONS 2023/2024

### EXAMINATIONS FOR THE DEGREE OF
### BACHELOR OF SCIENCE IN COMPUTER SCIENCE

### CSC452 – INFORMATION SYSTEMS CONTROL AND AUDIT

**DATE: JUNE 5, 2024**                    **TIME: 9.00AM - 11AM**
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**Registration No:  p15/136414/2019**

### INSTRUCTIONS:

i)    Write your Registration No. at the top of every page

ii)   Answer Question 1 and any other Two.

iii)  All your answers MUST reference the given case.

iv)   The answers should be typed into the document immediately after each question, preferably in a different colour

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**CASE:**  A performance audit report prepared by the Auditor General on the implementation of the National Optic Fibre Backbone Infrastructure (NOFBI) Project. The case, that you are familiar with, is provided separately.

**Question 1 (20 marks, 2.5 marks each)**

*Learning Outcome: To demonstrate knowledge of how to conduct information audits*

a) Identify four key policy documents reviewed during the audit and state their importance.

government cabinet memo on the establishment of the NOFBI project documents - this document outlines the motivation behind the NOFBI project

public audit act, 2003 documents - this legal framework mandates the office of the auditor-general to conduct audits, including performance audits, to assess the economy, efficiency, and effectiveness with which government resources are used

national government funding agreements oocuments - the audit report mentions that the operations of the NOFBI project were entirely financed by the national government

approved budgets for NOFBI phase I and NOFBI phase II documents - used to keep track of the money used in the entire project, and as a source of financial information and analysis during the audit

b) Identity two key IT governance issues discussed in the report and indicate how they are reported.

inadequate project planning and risk management - the auditors present this issue factually, using specific examples
weak contract management and vendor oversight - in the document t uses quantitative data and qualitative observations is used to report this.

c) Describe briefly the audit process used in the case. Performance audit report

the audit process used in the case of the national optic fibre backbone infrastructure (NOFBI) project involved several key steps, reflecting a comprehensive approach to evaluating the project's implementation and outcomes. here's a brief description of the process:

planning phase - the initial stage involved identifying the primary audit objectives, collecting and analyzing data, and developing a general understanding of the internal control design and effectiveness related to the NOFBIproject. this phase sets the foundation for the audit by defining what needs to be evaluated and how the evidence will be gathered.

fieldwork phase - during this phase, audit perso collected, analyzed, interpreted, and documented information necessary to accomplish the audit objectives and support the audit results. this involved visiting the sites where the NOFBI infrastructure was implemented, reviewing project documentation, and interviewing relevant stakeholders to gather firsthand evidence of the project's progress and impact.

reporting phase - following the collection of evidence, audit personnel prepared a draft report for management comment. this report detailed the findings from the fieldwork, highlighting areas of success and areas needing improvement. an exit conference was held to discuss these results with management officials, allowing for feedback and clarification before the final report was issued.

recommendation follow-up phase - once the final report was issued, the audit process shifted towards monitoring the implementation of recommendations. this phase ensures that the findings and recommendations from the audit are acted upon effectively, leading to improvements in the project's execution and outcomes.

d) Outline how the COBIT framework can be applied to the case.

align, plan and organize (APO) domain - this involves reviewing how well the project aligns with the national IT strategy and overall development goals.

build, acquire and implement (BAI) domain: this involves reviewing the selection process for technology and vendors used in the project.

deliver, service and support (DSS)  -  the  cobit's service management principles can be used to evaluate if there's a proper mechanism for reporting and resolving issues related to the project.

monitor, evaluate and assess (MEA)  -  the  cobit provides a framework to assess if the audit team has access to performance metrics like project completion rate, budget adherence, and user satisfaction related to the project

e) Identify two risks in the NOFBI project and for each suggest a mitigation.

scope creep and budget overruns  -  mitigation would invlolve developing a clear and well-defined project scope statement, regularly monitor project progress

security vulnerabilities in the fiber optic infrastructure  -  mitigation would invlove conducting regular security assessments to identify and address any vulnerabilities in the infrastructure.

f) Identify one audit objective for any three NOFBI stakeholders shown on the diagram in Section 3.07.

stakeholders  -  ministry of information and communications technology (moict):
audit objective  -  to assess the alignment of the NOFBI project with the moict's strategic objectives, particularly in terms of enhancing digital inclusion and improving public service delivery through increased internet accessibility. this involves evaluating whether the project's scope, budget, and timeline are consistent with the moict's long-term vision for national development.

g) Select any one of the nine specific recommendations made under '*Recommendation 2 - To improve the reliability of NOFBI services*'.
Explain how you would realise the selected recommendation.

I would realize this recommendation using a a feedback loop where insights gained from the monitoring system inform ongoing improvements to the NOFBI network. Regularly review the system's effectiveness and update the technology stack or processes as needed

h) Explain the importance of audit assurance in the NOFBI project.

*(2.5 marks each)*

public trust & accountability  -  the audit report's assurance helps maintain or restore public trust, showing that the government is accountable.

informed decision-making  -  the audit report provides valuable insights into the project's performance and progress.

ensures rigorous definition of success: audit assurance helps define what constitutes success for the NOFBI project from the outset.

enhances stakeholder confidence: audit assurance enhances confidence among stakeholders,

**Question 2 (15 marks)**

*Learning Outcomes:*

- *Perform an IS Audit in accordance with information systems audit standards, guidelines and best practices.*
- *Develop an Audit and Assurance Programme*

a) The COBIT framework is widely accepted in industry to plan, build, run and monitor activities to achieve the enterprise objectives.

You are required to provide evidence on how each of the governance and management objectives listed below have been applied in the case given.

  1) EDM02: Ensure Benefits Delivery
  2) APO03: Managed Enterprise Architecture
  3) BAI09: Managed Assets

(6 marks)

b) Create, retrospectively, an audit programme for the audit.

(4 marks)

c) Auditing user support services is critical in determining user confidence levels in the system. Identify the key users of NOFBI and discuss the key user support issues raised in the report.

(5 marks)

## Question 3 (15 marks)

*Learning Outcomes:*

- *Apply IS audit tools and skills to secure and protect the information assets of an organization*
- *Perform an IS Audit in accordance with information systems audit standards, guidelines and best practices.*

The audit was based on the Min of ICT Strategic Plan and contracts.

a) Identify the key requirements that were examined in determining contract compliance.

(5 marks)

b) Develop, retrospectively, an audit checklist for the implementation of Min of ICT strategies.

(5 marks)

c) One of the key recommendations (Recommendation 6.01. 1(vii)) is "foster infrastructure sharing among ICT service providers to enhance penetration and universal access ". Propose five ways how this can be achieved.

(5 marks)

**Question 4 (15 marks)**

*Learning Outcomes:*

- *Explain the importance of IS Audit, Control and Assurance in an organization*
- *Demonstrate how to manage the IS auditing process*
- *Perform an IS Audit in accordance with information systems audit standards, guidelines and best practices.*

a) The purpose of a risk management framework is to ensure the identification and management of all IT-related risks. Propose five ways risk management can be effectively integrated into the NOFBI project.

(5 marks)

enhance communication between teams - foster strong communication links between risk management and issues management teams. implementing a feedback loop that encourages knowledge sharing between these groups can lead to more effective risk identification, mitigation, and resolution

utilize predictive tools early on - at the project's outset, focus on employing predictive risk management tools to identify potential issues early. this proactive approach allows for the development of risk handling plans and recovery strategies before problems materialize

implement graded approach based on risk tolerance - adopt a graded approach to risk management that tailors the level of scrutiny and intervention to the potential impact of risks. this approach ensures that resources are allocated efficiently, focusing on high-priority risks that pose significant threats to the project's objectives

using lessons learned from similar projects - incorporate insights gained from past projects, especially those involving similar technologies or facing comparable challenges.

b) Conclusion No 5.01 is that the NOFBI infrastructure has not been utilised to full capacity available.

Identify two reasons why that is the case. For each reason, suggest a solution.

(5 marks)

reason 1 - poor quality termination and design flaws - the initial design of the NOFBI phase I was linear instead of ring-based, lacking redundancy. additionally, the main and protection cables were on the same line, meaning if one was cut, both were down. poor quality termination also contributed to the issue, making the infrastructure vulnerable to damage from factors like soil erosion, floods, vandalism, and animal burrowing.

solution - to address this, the government should consider upgrading the existing infrastructure to a ring topology, which provides redundancy and ensures that even if one part of the network is damaged, the rest remains operational. additionally, implementing stricter quality control measures during the construction and maintenance phases can prevent future damage due to poor quality termination.

reason 2 - low awareness and lack of commercialization efforts - there was low awareness about the NOFBI project and its benefits among the public and potential users. this lack of awareness, coupled with insufficient efforts to commercialize the NOFBI , resulted in the infrastructure's extra capacity not being leveraged to generate revenue. consequently, the project did not become self-sustaining as intended, placing a financial burden on taxpayers . solution -  to increase utilization and commercialization of the NOFBI , the ministry of ict should launch a comprehensive awareness campaign highlighting the benefits of the NOFBI project, such as improved service delivery in sectors like education and enhanced connectivity options. simultaneously, efforts should be made to lease out the unused capacity of the NOFBI to generate revenue, potentially through partnerships with isps or direct leasing to businesses and institutions.

c) Identify three challenges of auditing the NOFBI environment.

For each challenge propose a solution to achieve the audit objective.

(5 marks)

challenge 1 - remote auditing environment - conducting audits remotely poses challenges in verifying the authenticity of documents and ensuring the integrity of the audit process. this is particularly critical in environments where physical verification of assets and systems is often required

solution - utilize advanced technology solutions such as video conferencing for real-time document verification and secure cloud-based portals for document sharing. implementing digital signatures and encryption can further enhance the security and reliability of the audit evidence obtained remotely. regularly updating audit protocols to accommodate remote auditing practices will also be crucial.

challenge 2 - fraud risks - the NOFBI environment like many it infrastructures is susceptible to various forms of fraud including unauthorized access misrepresentation of assets and fraudulent transactions. the complexity of the infrastructure and the potential for significant financial losses make fraud detection and prevention a major concern
solution - strengthen internal controls and implement rigorous audit procedures focused on detecting anomalies and irregularities indicative of fraud. this includes conducting regular reviews of financial transactions, implementing stringent access controls, and employing advanced analytics to detect patterns of suspicious activity. engaging with external experts in cybersecurity and forensic auditing can also provide specialized insights and support in combating fraud.

challenge 3 - rapid technological changes - the rapid pace of technological advancements in the NOFBI environment necessitates ongoing updates to audit methodologies and tools to remain effective. keeping abreast of emerging technologies and their implications for audit processes is challenging 2.

solution - establish a dedicated team or committee responsible for monitoring technological trends and their impact on the NOFBI environment. this group should regularly update audit procedures and training programs to incorporate new technologies and best practices. collaborating with technology experts and participating in industry forums can provide valuable insights and opportunities for learning.

## Question 5 (15 marks)

*Learning Outcomes:*

- *Explain the importance of IS Audit, Control and Assurance in an organization*
- *Perform an IS Audit in accordance with information systems audit standards, guidelines and best practices.*

a) The audit concludes that the NOFBI project has not improved universal access to ICT services in Kenya as expected. Explain with two reasons why this is the case. What corrective actions are required?

(4 marks)

reason 1 - insufficient last mile connectivity solutions while the NOFBI backbone provides a robust infrastructure for long-distance data transmission, the "last mile" connectivity—connecting rural and underserved areas to the backbone—is often the weakest link. without adequate investment in last-mile solutions, the full potential of the NOFBI cannot be NOFBI , leaving many communities without reliable access to ict services 5.

corrective action - the government should prioritize investments in last-mile connectivity solutions, such as deploying fiber optic cables closer to end-users, establishing wi-fi hotspots in public spaces, and partnering with local governments and ngos to install community access points

reason 2 - limited affordability and accessibility of devices and services

explanation: even with the NOFBI backbone in place, the lack of affordable devices and high-quality internet services remains a barrier to universal access. many kenyans cannot afford the necessary hardware or subscribe to expensive internet packages, limiting their ability to participate in the digital economy

corrective action the government should implement policies aimed at reducing the cost of devices and internet services. this could involve subsidizing the purchase of computers and smartphones for low-income households, promoting the use of affordable and accessible internet packages, and encouraging competition among service providers to drive down prices

b) The COBIT control objective MEA03 is about Managed Compliance with External Requirements. Identify two compliance issues raised in the audit and suggest how they will be addressed.

(4 marks)

issue 1 : non-compliance with regulatory standards

compliance issue - the NOFBI project may not have fully complied with regulatory standards set by the communications authority of kenya or other international bodies. this could include standards related to data privacy, network security, and quality of service.

solution - to address this, the project should conduct a comprehensive review of all applicable regulatory standards and ensure that the NOFBI infrastructure and operations fully meet these requirements. this includes implementing necessary security measures, adhering to data protection laws, and meeting service quality benchmarks. regular audits and certifications can demonstrate compliance and help maintain trust with regulators and stakeholders.

issue 2: inadequate monitoring and evaluation of compliance

compliance issue - as highlighted in the deloitte risk services report, there may be a lack of active measurement of the effectiveness of the compliance program within the NOFBI project. this could result in a reactive approach to compliance, focusing on counting incidents rather than preventing them or measuring the overall effectiveness of the compliance process.

solution - to improve compliance monitoring and evaluation, the project should adopt a more holistic approach that goes beyond simply counting incidents. this includes developing and implementing key performance indicators (kpis) that focus on quality, value, volume, and performance of the compliance function. regular reviews and assessments should be conducted to evaluate the effectiveness of the compliance program and identify areas for improvement. engaging with external experts or consultants can also provide

valuable insights and recommendations for enhancing compliance
management

c)  The main goal of a performance audit is to ensure effective use of public
resources and promote delivery of public services to Kenyans. Discuss if the
NOFBI has achieved this goal.

(4 marks)

the main goal of a performance audit, as stated by the auditor-general is to ensure
the effective use of public resources and promote the delivery of public services of
outstanding quality to kenyans given this objective the successful implementation of
the NOFBI project was deemed essential for overcoming the challenges posed by low
population density and physical remoteness from cities, thereby improving the
quality of public services delivered to kenyans . but despite the project's potential to
revolutionize the delivery of public services, the audit report indicates that the
benefits expected from the NOFBI project had not been realized by the time of the
audit. this suggests that the project may not have effectively promoted the delivery
of public services of outstanding quality to kenyans, thus  it appears that the NOFBI
project has not fully achieved the main goal of a performance audit, which is to
ensure the effective use of public resources and promote the delivery of public
services of outstanding quality to kenyans. the project's failure to reduce the cost of
internet and expand access to broadband networks, despite significant investment,
indicates shortcomings in achieving these objectives

d)  One of the objectives of the course was to perform an IS audit in accordance
with best practices. Identify three best practices applied in the case.

(3 marks)

adequate preparation and planning  -  before initiating the audit, it is crucial
to conduct thorough planning and preparation, this includes understanding
the scope of the audit, identifying the key areas to be reviewed, and preparing
a detailed audit plan

continuous support from management  -  the involvement and support of senior management throughout the audit process are vital

focus on meaningful insights and value addition  -  an effective is audit should aim to provide meaningful insights that drive improvements and support the organization's risk management and governance objectives.