

# Revitalizing Government Internal Auditor Apparatus in the Era of Industry 4.0

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**Abstract** - The purpose of this paper is to propose a transformation strategy which is the focus of the Government Internal Supervisory Apparatus (APIP) on the impact of Industry 4.0 on the internal audit function and the development of an improvement plan for the Internal Auditor SPIP level. can be applied to address audit challenges in the industry 4.0 era. Due to the impact of Industry 4.0 on audit activities, APIP is required to be able and quickly adapt to technological advances. The adoption of Industry 4.0 technology positions APIP as an activity analyst who can identify errors in business processes and devise solutions to fix them. As a consequence, an APIP transformation strategy is needed to face the challenges of Industry 4.0. The author suggests that the APIP transformation strategy to increase the SPIP level must include: (1) the use of data collection equipment, such as sensors and software, to collect data; (2) inclusion of characteristics that characterize APIP's ability to complete audit tasks, including cognitive abilities, problem solving abilities, communication skills, internal control systems, and agility; and (3) applying a professional, millennial, innovative approach that prioritizes integrity, objectivity and professionalism while still embracing the possibility of failure.

**Keywords:** *IACM, APIP, Industry 4.0, SPIP Level, Transformation Strategy*

## 1. Introduction

The current phase of technological advancement in manufacturing and production is known as the Industrial Revolution 4.0, or called the fourth stage of the industrial revolution that is a term coined in 2016 by Klaus Schwab, Founder and Executive Chairman of the World Economic Forum (WEF). This revolution involves the merger of advanced technologies such as artificial intelligence, big data analytics, Internet of Things (IoT), robotics and 3D printing. Industry 4.0 is expected to create efficient, autonomous, and flexible smart factories that can significantly increase productivity, safety and quality, and lead to updated job opportunities and business models, and physical systems, cloud computing, real-time data analytics, and intelligent machines that enable manufacturers to communicate, connect, monitor, and control production processes remotely, as well as optimize operations in real-time.

However, it is also important to acknowledge the challenges that come with Industry 4.0, including ethical considerations around the application of automation and artificial intelligence, as well as cybersecurity and data privacy issues. It is important to establish policies and regulations that ensure the responsible and ethical use of Industry 4.0 technology while safeguarding the rights and interests of all stakeholders. Understanding the implications of Industry 4.0 is paramount for government institutions, such as the Badan Pengawasan Keuangan dan Pembangunan (BPKP), as they navigate the

economic, societal, and labor market landscape. Embracing Industry 4.0 technologies can significantly boost national economic competitiveness by fostering efficiency, automation, and connectivity through innovations like the Internet of Things, artificial intelligence, and robotics. BPKP's role is crucial in overseeing this transition, ensuring effective governance, compliance, and strategic planning. By actively supporting businesses in adopting these technologies through policy frameworks and incentives, government institutions contribute to a sustainable and inclusive economic growth trajectory.

However, the inadequate understanding of Industry 4.0 at BPKP has resulted in difficulties in overseeing and managing financial and development aspects related to the implementation of Industry 4.0 technologies. This lack of understanding has created risks concerning data integrity and financial risk assessment that may arise from the adoption of new technologies. The phenomenon has also impacted the oversight of policies and regulations related to data protection, cyber security, and ethical aspects of technology within BPKP. Additionally, risks of economic benefit inequalities from technology adoption have emerged, highlighting BPKP's inability to design policies that support fair and sustainable benefit distribution. In this context, efforts to improve the understanding of Industry 4.0 at BPKP become crucial to ensure that the institution can be more effective in carrying out its supervisory



duties and positively contributing to economic and social development in the era of Industry 4.0. ,

In short, the fourth industrial revolution represents a very significant change in the way goods are produced and consumed, bringing with it many opportunities for innovation and growth. However, it also poses significant challenges, including cybersecurity, data privacy, and ethical considerations, which must be addressed through policies and regulations to ensure the responsible and ethical.

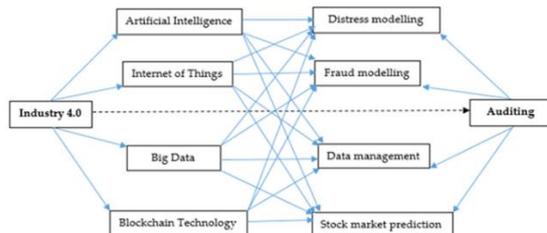


Figure 1: Relations between Industry 4.0 with audit function (Author's idea)

Figure 1 illustrates the potential link between Industry 4.0 and the audit function, which can be fully leveraged. The figure illustrates how various aspects of Industry 4.0 form correlations that are interconnected and influence the main things in auditing and are able to overcome each stage and challenge in auditing. As shown in the diagram above, each aspect of Industry 4.0 can independently address one or more problems encountered in standard audit work. It is important to note that the image above is only a simple illustration, but the authors believe that the relationship is much more complex, and that technology plays an important role in the audit process.

The emergence of Industry 4.0 has had an impact on various aspects of accounting work, including taxation, financial accounting, internal control, management accounting, risk management, auditing, and corporate fields. Automation and digitalization have replaced many traditional functions within the accounting workspace. The World Economic Forum predicts a 26% decrease in accounting jobs by 2022 due to this shift (Leurent & Abbosh, 2018). Nevertheless, accountants and auditors can overcome these challenges by acquiring advanced analytical skills, such as big data analytics, artificial intelligence, and the internet of things, supported by Industry 4.0. This will enable them to proactively detect, prevent, and solve problems (Elzarka & Transport, 2022).

The impact of Industry 4.0 is also very important for governance and the role of government internal auditors (APIP). In this era of disruption, APIP must adapt to changes in audit activity caused by Industry 4.0 and carry out its duties effectively to ensure successful governance (Firmansyah et al., 2023).

APIP also needs to pay attention to risks in the

digitalization process. Data security is a challenge in digitalization compared to data. Therefore, APIP must pay attention to aspects of security and data protection in every stage of the audit process. This can be done by using the latest technology, such as data encryption, firewalls, and intrusion detection systems, as well as implementing strict data security procedures.

In the context of Industry 4.0, auditors face several challenges. To address these challenges, auditors can prioritize assurance and guarantee the quality and reliability of information presented in financial reports and business processes (Setianingsih et al., 2023). Additionally, auditors can collaborate with experts in their respective fields, invest in disruptive technologies, and anticipate potential risks that may arise in the future. This can be achieved through continuous learning and skills development, as well as using the latest technologies to improve the efficiency and efficacy of the audit process.

In a conference organized by the Ministry of Finance, the government's internal auditors stated that APIP must at least obtain a level 3 (integrated) degree of 85% in 2019 according to the President's direction. By having adequate qualifications, APIP can meet the needs of audits in the industry 4.0 era.

In addition, the IACM is a model developed by The Institute of Internal Audit (IIA) to assess the level of capability of an APIP institution. The basic principle of IACM is that internal control is an integral component of effective governance in the public sector. Three variables that must be considered in assessing the level of APIP capability are internal control activities, organization, and the environment as a whole.

In implementing IACM, APIP can evaluate itself and make continuous improvements to increase its capability in carrying out the internal control function. This can be done by adopting the principles of good governance, strengthening internal governance, and improving the quality and effectiveness of internal control (Ejoh & Ejom, 2014).

Table 1. APIP Levelling Level

Level	Information
Level 5 (optimize)	APIP becomes the full agent of change
Level 4 (Managed)	APIP has the ability to provide all-encompassing assurance related to governance, risk management, and internal control
Level 3 (Integrated)	APIP is able to access the effectiveness, efficiency, economics of an activity and is able to provide consultation
Level 2 (Infrastructure)	APIP can ensure the procedure adheres to the standards and can instance of misconduct
Level 1 (Beginning)	APIP has failed to provided assurance regarding the enforcement of government regulation and prevention of corrupt activities

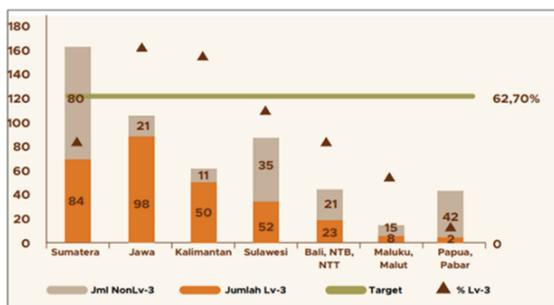
Source: <https://www.semanticcholar.org/>

In Table 1. (IACM) divides the APIP level into 5 levels and Each capability level consists of 6 (six) elements, elements of service and roles, elements of Human Resource management, elements of professional practice, elements of Accountability management and Performance, relationship elements and organizational culture, as well as elements of governance.

Table 2. Comparison of Maturity Spip Achievements of Ministries/Institutions/Regional Governments in 2020 and 2021

No	SPIP is due	Ministries/Institutions/Regional Governments			
		2020	2021	+/-	%
1	>= Level 3	379	386	7	1,12
2	Level 2	193	195	2	0,32
3	Level 1	57	43	(14)	(2,24)

Source: BPKP Performance Report 2021



source: 2021 BPKP-Performance Report  
Figure 2 . SPIP Level Maturity Achievement Chart

Based on Table 2 , the achievements of SPIP Level 3 maturity in 2 regions (Java and Kalimantan) have met/exceeded the 2021 target (82.35% and 81.97%). Five regions (Sumatra, Sulawesi, Maluku-Malut, Bali-NTB-NTT, and Papua-Pabar) have not reached the target, namely 51.22%, 59.77%, 52.27%, 34.78% and 4.55%.

In Figure 2 it can also be seen that almost all APIPs in the region have just reached SPIP Level 3 and there are even around 195 APIPs who are still at level 2 and 43 APIPs at level 1, and Figure 2 shows the APIP data of Inequality levels 2 and 1 which dominate in the Region East. This shows that there are still many government agencies that have not been able to carry out internal control practices effectively and efficiently to achieve the goals that had been planned previously. This can result in a lack of accountability and transparency in the delivery of public services.

Very worrying about the conditions, where the unpreparedness of the auditor and auditee can adversely affect the monitoring process and reduce the ability to provide relevant information in accordance with the audit objectives.

The causes of APIP's limitations in achieving SPIP level 4 and others are:

1. Limited human resources: APIP implementation requires qualified and competent human resources

in the field of internal control. However, not all government agencies have adequate human resources to properly implement APIP.

2. Limitations of IT : The use of IT can facilitate APIP implementation, such as performance management information systems and performance accountability information systems. However, there are still many government agencies that have not utilized information technology optimally.
3. Organizational complexity: Each government agency has different characteristics and organizational structure, so APIP implementation in each agency can have different challenges. This can hinder efforts to achieve SPIP level 4.

The limitations of APIP mentioned above should be minimized and mitigated by understanding and using appropriate Information Technology, given the increasing number of APIP tasks with an increasingly high level of complexity, it is hoped that the 4.0 Industrial Revolution can provide convenience in carrying out duties as an official Internal Auditor.

To support the achievement of GCG, the role of internal auditors must be carried out properly and orderly. The audit era, which has very high gaps, in accordance with the demands of the current era, can hinder the process of supervising a task, thereby reducing public trust in the role of the auditor. Therefore, this article discusses APIP's transformation through innovation and adaptation to welcome Industry 4.0, in order to anticipate the risk of disruption to the profession.

## 2. Research Methods

This research aims to examine the problems and challenges faced by internal auditors in conducting IT audits in government agencies under the influence of Industrial Revolution 4.0.

The approach in this research is a literature study which is complemented by the results of distributing questionnaires and interviews. The literature study covers the challenges that government internal auditors will face as well as the professional skills they must have in the Industrial Revolution 4.0 era. The research process was carried out using a snowball model. Starting with the development of information and communication technology in the public sector, such as the implementation of e-Government, and research centers related to this topic.

Research statements are taken from a collection of expert opinions and combined into one, includes the following steps:

1. Collect sources of information and literature from various sources such as books, the internet, previous papers, own experience, and material related to the topic.
2. Read and check every source of information obtained.

3. Identify information that is relevant to the topic to be discussed.
4. Summarize key points from any relevant literature.
5. Arrange the important points that have been obtained in a structured manner into a paper.

Research was also conducted through interviews and discussions with 56 government internal auditors in Indonesia, to cover all types of problems and solutions. The aim of using focus group discussions in research is to obtain as much information as possible from a group of experts on a particular topic. This is done by prompting the group with predetermined topics and open-ended questions, allowing discussion to develop around these open-ended questions, and facilitating interaction among participants. This process allows participants to insert their own observations and insights while also feeding off ideas from other participants. Using focus group discussions allows researchers to extract expertise and insight from the participants. Focus group discussions are especially useful when access to data is limited and when researchers are dealing with unexplored and emerging phenomena (Sutton et al., 2008; O’heocha et al., 2012).

Table 4. Respondent Profile

Description	Amount	(%)
Gender:		
Man	43	76.79%
Woman	13	23.21%
Age:		
<30 years	21	37.50%
31-40 years old	22	39.29%
41-50 years old	7	12.50%
> 50 years	6	10.71%
Education: Diploma		
Bachelor	25	44.64%
Postgraduate	23	41.07%
Length of Service:		
<5 years	19	33.93%
6-10 years	20	35.71%
11-15 years	4	7.14%
16-20 years old	4	7.14%
> 20 years	9	16.07%

### 3. Results and Discussion

#### 3.1. Audit Evolution: From 1.0 to 4.0

Auditing must be able to adapt and update with the new environment in line with the development of the industry to the next generation. Based on the type of software/tools used to help carry out the audit process, audits can be categorized into 4 (four) generations. The audit categories are described in the following table:

Table 3. Audit Generation Table

Audit 1.0	Audit 2.0	Audit 3.0	Audit 4.0
Manual, traditional audits	IT audit tools: CAAT	Audit analytical, AI and Big	Semi-Automated, Semi-

Audit 1.0	Audit 2.0	Audit 3.0	Audit 4.0
typically rely on tools such as a pencil and calculator	software, Microsoft Excel	Data based Software audit, cloud technology, robotic process automation (RPA)	Progressive Audit Tools: AI, Blockchain, RFID, AR, Sensor, Iot/Ios, CPS, GPS

Source: BPKP Performance Report 2021

Manual auditing (Audit 1.0) has been used for thousands of years and has served a variety of purposes. However, since the introduction of IT Auditing (Audit 2.0) in the 1970s, most modern businesses rely heavily on computers. However, conventional auditors who are not trained in IT and analytics still perform manual tasks. This is due to the conservative and inflexible nature of the profession and outdated regulations that limit the use of quality tools (Firmansyah et al., 2023). Table 3 describes the main characteristics of this generation of audits.

In addition, it is anticipated that the Audit 4.0 generation will emerge than the previous generation because the new Big Data platform cannot be secure using old technologies. Obsolete regulations that rely on a sample of 70 transactions to evaluate millions of transactions can also cause delays and reduce the value of external collateral.

#### 3.2. Elements of Audit 4.0

The audit industry will undergo a major transformation through the implementation of Audit 4.0. This will require automating existing processes, expanding their coverage, shortening turnaround times, and ultimately increasing overall underwriting rates. This article examines the impact of Audit 4.0 on the auditing profession from four different perspectives: Principles, technology, standards, and auditors.

##### 3.2.1. Principle

Industry 4.0 has six main technical principles, such as:

**Interoperability**, as one of the main principles of Industry 4.0, is also the driving force behind Audit 4.0. This concept enables devices, machines, factories, and products to connect and interact via a global network, enabling real-time monitoring and settlement. To achieve this, a secure network is needed that allows separate business organizations to communicate and collaborate on automated transaction analysis (Jans et al., 2013). With interoperability, auditors and management can be notified of suspicious transactions quickly (Borgi, 2022). As business structures evolve and change, interoperability will become increasingly important to the auditing profession.

**Virtualization**. In Industry 4.0, networked systems can exchange and integrate various data, such as position, location, environmental conditions,

and other data. This data can be searched, filtered, explored, and analyzed, reflecting all company objects, data, interactions, and actions. This provides transparency by presenting all business activities and their results. Virtual process monitoring enables administrators to identify problems and also supports research and development to detect and eliminate potential defects in production plans (Joshi & Marthandan, 2020).

**Decentralization.** In the Industry 4.0 era, cloud systems with virtual machines have become commonplace in corporate IT. This technology allows independent users who can perform multiple functions, which will eventually lead to a network of "tools" that are bigger and smarter than using RFID chips. The demand for customized products is increasing, giving rise to manufacturing systems that are more complex and difficult to control from a central location (Bogataya & Evstaf'eva, 2020). To meet this demand for customization it must be decentralized so that each machine can make its own.

**Real-Time Capability.** it is also suggested by Vasarhelyi, Halper, and Ezawa where analytic rules are used to generate an initial alert that starts the actual audit (Ilanković et al., 2020). monitoring systems are constantly equipped at factories to identify problems and adjust production in real-time. This capability allows factories to react quickly to changes in market demand, technological advances, and regulations. In addition, a cost-effective methodology has been developed by Siemens Corporation to monitor real-time controls within the plant (Merdzan, 2021). In addition, Kim & Vasarhelyi (2012) have devised a methodology to quickly and effectively detect fraudulent online transactions via wire transfers. This model identifies fraud indicators and estimates the overall fraud risk, enabling the auditor to investigate further. The "audit by exception" approach.

**Service orientation.** Although data analysis is an efficient technology recognized by the auditing profession, its use has not fully met expectations as noted by previous studies (Liu & Vasarhelyi, 2014). One of the key qualities of Industry 4.0 is service orientation, which involves providing access, cyber-physical, and human that other users can take advantage of. This business strategy can prove especially beneficial in industries where the demand for customized products is increasing, as it can significantly reduce production costs and increase profits by increasing stakeholder participation (Bogataya & Evstaf'eva, 2020). Auditors can enlist the help of professionals to assist with analytical work, so they can focus on important judgments. In addition, cloud-based audit software services are available, which can offer several benefits to auditors, such as increased scalability, flexibility and reduced costs (Moffitt & Vasarhelyi, 2013). Therefore, service orientation can help improve audit effectiveness and provide added value to audit clients.

**Modularity** is a very important feature of Industry 4.0 which allows easy adaptation to changing conditions and needs. This is useful for dealing with seasonal fluctuations and developing new configurations (Camarinha-Matos et al., 2015). Modularity can also help auditors to analyze more flexibly and efficiently. By using the audit application as a module, auditors can combine different modules for a more comprehensive analysis (Gorecky et al., 2014). Auditing applications refer to a series of rigorous analytical routines performed by computerized instruments. Auditors can identify and use appropriate audit applications with customized audit plans and perform audits by exception. This approach can improve the overall efficiency and effectiveness of the audit process. For example, the auditor may select and install a different set of applications for each audit client based on risk, business environment, client capability, and auditor qualifications.

### 3.2.2. Technology

The integration of advanced technologies such as AI, IoT, blockchain, sensors, CPS, IoS, and smart enterprises in Industry 4.0 can have a significant impact on auditors (Mariyam et al., 2022). This technology gives auditors access to real-time data and insights, enabling them to conduct more comprehensive and accurate audits. For example, IoT sensors can provide auditors with information about the condition and location of assets, enabling them to perform asset verification and tracking more efficiently. Data analytics can help the auditor identify anomalies and patterns that might indicate fraud or error in financial reporting (Appelbaum et al., 2017).

In addition to these technologies, RFID and GPS can also improve auditing. RFID tags can be used to track inventory and assets, while GPS can provide useful location-based data for verifying financial transactions. Audit 4.0 can leverage this technology to develop more efficient and effective audit procedures, giving auditors a better understanding of their clients' businesses and operations (Marcos A. Pisching et al., 2015).

### 3.2.3. Standard

The prevalence of computer applications in modern systems requires the formalization of audit standards (Borgi, 2022). Formal representation is needed to remove ambiguity in auditing standards so that they can be embedded in software and provide near real-time assurance. interconnected objects in the system are also important factors in formalizing auditing standards.

### 3.2.4. Auditor Skills

The need for auditors to adapt their skills in the world of automation and process control is increasing (Bogataya & Evstaf'eva, 2020). They

suggest that auditors should be more technologically professional, but also emphasize the importance of designing processes that can be easily used by those with less technical expertise. Byrnes et al. created a "super app" to assist auditors with clustering, which not only groups data but also incorporates statistical analysis to assist and facilitate auditors.

Information technology has changed the way transaction data is stored and processed. Technological developments make computers faster, more efficient, capable of storing large amounts of memory and capable of performing complex calculations (Werner et al., 2021). This has been exploited in various business fields, including in the field of accounting, computers have facilitated the implementation of accounting and the preparation of financial reports.

Differences in manual processing characteristics and computer processing include:

1. Transaction trails Manual processing is very different from computer processing. Manual transaction traces are paper documents with check lists, signatures and bold markings. Traces of computer processing do not appear in paper form but are available in a form that is easy for the computer to read.
2. Non-uniform transaction processes. Computer processing places similar transactions on the same processing instructions. This eliminates typos that usually occur in manual processes. In contrast, computer processing errors will result in uniform errors on the same transaction.

### 3.3. Information and Technology in the Public Sector

Advances in computers and information technology have been the biggest impetus affecting organizations in recent years. The use of technology makes it easier to deliver services that have the potential to benefit both customers and service providers (Marcos A. Pisching et al., 2015).

The term *e-Government* emerged in 1999, but the activity referred to is much older and parallels the history of computing in business organizations. E-government is the use of information and communications technology (ICT) to promote more efficient and cost-effective government, facilitating easier government services, allowing greater public access to information, and making government more accountable to citizens (Yaremyk & Yaremyk, 2021).

E-government not only provides benefits such as fast, cheap, trustworthy, and reliable services for citizens and businesses, but also offers the potential to reshape the public sector and simplify relations between citizens, businesses, and government by enabling open communication, participation, and public dialogue in formulating national regulations (Hin & Subramaniam, 2008; Ke & Wei, 2004)

The Indonesian government requires all central government agencies to implement the Agency Accounting System (SAI), State Property

Management Information System (SIMAK BMN), and various other applications.

The use of technology-based applications is also implemented by local governments. Financial management applications for regional governments are quite diverse, for example the Regional Management Information System (SIMDA), the Regional Financial Management Information System (SIPKD), and the Regional Financial Management Information System (SIMKADA).

The development of the use of information technology-based applications has many implications, such as reducing paper documents and giving rise to new risks related to the use of information systems (Olewi, 2023).

### 3.4. Opportunities and Challenges for Government Internal Auditors in the Digital Era 4.0

*The Institute of Internal Auditor's (IIA)* emphasizes that the purpose of internal auditors is to assist organizations in achieving their goals. This can be done through increasing the effectiveness of risk management (where risks that interfere with achieving organizational goals become the main focus), internal control (to ensure that organizational goals are realized), and governance processes (an organization without good governance becomes an obstacle to achieving organizational goals) (Hermann et al., 2015).

Controls over information technology represent a distinct category of internal control and receive special attention in professional publications (e.g., COSO and COBIT) and audit standards (e.g., PCAOB Auditing Standard No. 5, 2007). This special attention is necessary because computerized environments are often associated with financial misstatements and less reliable financial reporting (Rikhardsson & Dull, 2016)

In the world of Audit 4.0, the audit process will be highly automated, interconnected and intelligent, so it is important for auditors to adopt new technologies such as Robotic Process Automation (RPA) to improve efficiency and accuracy. However, successful RPA implementation requires careful planning and strategy to ensure a smooth transition.

One important factor to consider when implementing RPA in an audit is determining which audit process to automate first. This decision should be based on a thorough analysis of the audit process to identify areas that are repetitive, time consuming and error prone (Rakipi et al., 2021). For example, tasks such as data entry, data verification, and data analysis can be automated using RPA, freeing the auditor time to focus on higher-order thinking skills such as risk assessment, evaluating internal controls, and identifying fraud indicators.

Another important factor to consider when implementing RPA in an audit is to ensure data accuracy and integrity. RPA relies on accurate and reliable data to carry out its work, so it is important to

have proper governance and data management in place. This includes data standardization, data security, and data quality checks to ensure that the data used by RPA is consistent and reliable.

Finally, the auditor must also consider the ethical implications of the RPA in auditing. While RPA can improve efficiency and accuracy, it can also cause job shifts and raise concerns about the objectivity of automated decisions. Therefore, the auditor must be vigilant and ensure that RA is used ethically and responsibly, with appropriate oversight and control (Ejoh & Ejom, 2014).

In short, implementing RPA in auditing can result in significant improvements in audit efficiency, accuracy, and quality. However, auditors must carefully consider factors such as priority of process automation, data accuracy, and ethical implications to ensure a successful transition to the world of Audit 4.0. Which audit process should be automated first?

1. What identifiable steps in the audit process are suitable for automation?
2. What benefits can be expected from automating audit procedures?
3. What data formats are compatible with machine reading?
4. Based on the previous stage's assessment, which audit procedures should be prioritized for automation?

Table 5. Results of the IT 4.0 Implementation Questionnaire

No	Description	Low	Mid	High	Total
1	The influence of technology use on the performance of public sector agencies	10.71%	41.07%	48.21%	100.00%
2	The level of positive influence of the use of technology on the performance of public sector institutions	12.50%	25.00%	62.50%	100.00%
3	Negative effects of technology use on the performance of public sector institutions	42.86%	48.21%	8.93%	100.00%
4	The influence of the use of technology in the government budget process	8.93%	30.36%	60.71%	100.00%
5	The influence of technology use on the internal audit process	8.93%	35.71%	55.36%	100.00%
6	How important is it for a local government auditor to have skills and knowledge about IT audits?	12.50%	26.79%	60.71%	100.00%
7	How important is local government auditors in utilizing Information Technology 4.0	10.71%	42.86%	46.43%	100.00%

8	How well do local government auditors understand in utilizing Information Technology 4.0?	44.64%	42.86%	12.50%	100.00%
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Table 6. Results of the Institutional Readiness Questionnaire

Description	Low	Mid	high	Total
How much support does the institution have for improving IT capabilities?	42.86%	48.21%	8.93%	100.00%
How often utilize Information Technology for audit tasks	12.50%	25.00%	62.50%	100.00%
ease of taking IT training	48.21%	33.93%	17.86%	100.00%
IT Certification for Auditors	58.93%	26.79%	14.29%	100.00%
Is IT 4.0 relevant to Audit?	12.50%	26.79%	60.71%	100.00%
Utilization of Information Technology 4.0 for audit activities	41.07%	26.79%	32.14%	100.00%

The results of the focus group discussion stated that IT 4.0 skills are really needed by government internal auditors at this time because of the emergence of many application-based systems in government starting from planning, administration, and reporting applications. By knowing the processes, strengths and weaknesses of application-based systems, auditors can simplify the process of monitoring and controlling existing systems. If the auditor does not have adequate IT understanding, the audit process will not run smoothly. As stated by a respondent: "... *the use of technology 4.0 in the public sector must of course be followed by improving the IT capabilities of government internal auditors.*"

Problems faced by government internal auditors in Indonesia include:

1. The use of IT 4.0-based audits in Indonesia has not run optimally due to limited resources (men, machines, and money).

The low IT capabilities of government internal auditors make the risk of using information and technology in government agencies even higher. The government needs to pay more attention to improving the quality of their internal auditors. To overcome this problem, one respondent said:

"... *a mandatory IT 4.0 audit certification is required for government internal auditors*".

2. Lack of government support, such as IT 4.0 audit facilities and training programs.

Based on this research, only 8.93% of respondents stated that institutions strongly support training opportunities for auditors, 48.21% rarely, and 42.86% do not support. This problem needs to be

overcome if the government has a strong commitment, as one respondent said:

*"... governments must prioritize the implementation of their IT audits, facilitating with adequate funding and training for their auditors"*.

3. Low ability and knowledge of audit applications based on technology 4.0. The results of respondents showed that 1.8% always used audit applications in their work, 32.14% often, 26.79% rarely, and 80.4% never used them. This result is also in accordance with the survey results that only 32.14% of respondents could use the audit application. This problem can be overcome if institutions care more about ongoing training and education for their auditors.
4. Obstacles in having auditor certification. The research results showed that 5 8.93% of respondents stated that the obstacle to having auditor certification was because of the high cost, 16.1% because they did not know the benefits of certification, 16.1% felt that certification did not support their performance, 12.5% lacked motivation, and 5.4% because of the difficulty of the exam.

The results of the focus group discussion also concluded that an APIP strategy is needed as the government's internal auditor in Indonesia in utilizing Technology 4.0, including:

1. Embrace automation: APIP should embrace automation to reduce manual processes and increase the accuracy and reliability of audit processes. Automation can include the use of machine learning (ML), robotics process automation (RPA), and artificial intelligence (AI), and to analyze data and identify anomalies.
2. Improve data analytics: APIP should also improve its data analytics capabilities to identify and analyze data patterns that could indicate fraud, errors, or other issues. Data analytics tools can help auditors quickly identify and analyze large amounts of data, reduce the risk of errors, and increase audit efficiency.
3. Emphasis on cybersecurity: With the increase in cyberthreats, APIP should focus on identifying and mitigating cybersecurity risks. This involves evaluating the adequacy of security controls, assessing the vulnerabilities of critical systems, and identifying potential threats.
4. Emphasizing soft skills: While embracing technology is important, APIP should also develop soft skills such as communication, collaboration, and critical thinking. These skills will assist the auditor to work effectively with colleagues in various departments and to communicate findings effectively to stakeholders.
5. Continuous learning: With the technology landscape changing rapidly, APIP must prioritize continuous learning to stay abreast of new technologies, processes, and methodologies. This involves attending training sessions, conferences,

and other learning opportunities to stay abreast of the latest trends and best practices.

6. APIP needs to have the ability to collect data using sensors and software, which will allow them to provide companies with comprehensive assurance.
7. APIP requires abilities that will set them apart in completing their audit assignments, such as cognitive abilities, problem solving skills, communication skills, information skills. Good cognitive abilities help auditors to identify problems accurately and provide effective solutions. APIP must have a strong understanding of their duties and responsibilities in the internal control system, bearing in mind that each assignment may have different objectives, methods, and results. Nonetheless, APIP's job is to provide assurance and consulting, which requires good agility to adapt quickly to any changes during an audit.
8. APIP must be professional, able to improve capabilities, and be innovative while prioritizing integrity, objectivity, and professionalism. Technology advances provide opportunities for innovation in supervision and monitoring, review, and audit by using a system that suits the needs so that it adds value to the organization and is inclusive, meaning that innovation directly benefits partners and ultimately achieves organizational goals.

APIP's proficiency in information technology can be enhanced through education and training, which is crucial for equipping auditors with the necessary skills. Keeping up to date with the latest technological advances is essential to ensure the auditor's competence in the digital age. Therefore, mastering audit techniques, principles, and procedures related to information technology is vital for APIP. The auditors must possess data and technology literacy to make the most of opportunities and overcome challenges in the fourth industrial revolution. Data literacy is crucial for APIP to effectively process and analyze vast amounts of data, leading to improved monitoring services. Technology literacy is also essential for auditors to utilize digital technology efficiently for data processing and information management. Developing these competencies can better prepare APIP to confront the challenges of the fourth industrial revolution and help ensure the organization's operations' integrity. (Rahayu et al., 2020).

#### 4. Conclusion

Based on the research and discussion presented, it can be concluded that the challenges faced in the Industry 4.0 era include transformation skills for internal auditors in this era involving embracing information technology, increasing data analysis, considering cybersecurity, developing soft skills, information technology security, and

prioritizing continuous learning. By adopting these skills, internal auditors can improve their efficiency and effectiveness, and add value to their organization. Then To survive in this era, APIP needs a transformation strategy, which includes: (1) the ability to collect, process and read data using software tools, (2) has characteristics such as cognitive abilities, problem solving skills, communication skills, application internal control system, and agility in completing audit tasks, and (3) maintaining professionalism, millennial and innovative, and prioritizing integrity, objectivity and professionalism with no fear of failure.

The research results also show that although IT skills and expertise are needed in carrying out the duties of government internal auditors, there are still obstacles in the form of a lack of organizational attention and low motivation of government internal auditors which results in the small number of government internal auditors who have skills and knowledge in the field of IT Audit. .

In accordance with the Indonesian Government's commitment to e-Government, the use of IT in managing state/regional finances is a demand that must be implemented. With the increasing use of IT in government agencies, accountability from budget users and understanding of IT by auditors is a must. Government internal auditor institutions must start mapping IT management risks and pay more attention to improving IT-based audit competence.

The limitation of this research lies in the potential challenge of generalizing the proposed transformation strategy. The focus on the Government Internal Supervisory Apparatus (APIP) and its specific internal audit function might restrict the applicability of findings to other organizational contexts. The dynamics, organizational structures, and technological readiness can vary significantly across different sectors, raising questions about the broader transferability of the suggested strategy.

A critical factor influencing the success of the proposed transformation strategy is the existing technological infrastructure and readiness of APIP. This poses a potential limitation, as organizations with inadequate resources or facing obstacles in adopting Industry 4.0 technologies may struggle to implement the suggested changes effectively. Exploring the extent to which technological dependencies impact the strategy's feasibility and success is crucial for understanding its real-world applicability.

Another limitation of this research is the relatively limited exploration of human factors in the context of implementing the transformation strategy. While the study recognizes the importance of APIP's ability to adapt to technological advances, it may not thoroughly investigate human-centric elements such as resistance to change, training needs, and the broader implications for the workforce. A deeper understanding of these human factors is essential for

a comprehensive assessment of the strategy's viability and potential challenges during implementation

Building upon the identified challenges in the Industry 4.0 era, future research should focus on strategies to enhance the IT competence and motivation of government internal auditors. The study could investigate specific interventions and organizational initiatives aimed at addressing the obstacles related to the lack of attention and low motivation among government internal auditors in acquiring IT skills and expertise. Exploring the effectiveness of training programs, professional development opportunities, and motivational initiatives can contribute valuable insights into fostering a proactive and skilled workforce in the realm of IT Audit.

Moreover, understanding the specific barriers that hinder the adoption of IT skills among government internal auditors is crucial. The research could delve into organizational cultures, leadership support, and existing policies that may impact the willingness of auditors to embrace IT-related responsibilities. Recommendations stemming from such research could offer practical guidance for governmental agencies and internal audit institutions in developing targeted strategies to overcome these obstacles.

Additionally, given the commitment to e-Government and the increasing reliance on IT in managing state/regional finances, future research could explore the integration of technology-driven audit processes. This includes examining the effectiveness of IT-based audit methodologies, risk mapping in IT management, and the alignment of audit practices with the evolving landscape of e-Government. By addressing these aspects, the research can contribute to strengthening the capabilities of government internal auditors, ensuring their proficiency in navigating the challenges posed by Industry 4.0 and fostering a culture of continuous learning in the audit profession.

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