

INTERNAL AUDITORS' ARTIFICIAL INTELLIGENCE CAPABILITIES AND SUSTAINABLE COMPETITIVE ADVANTAGE

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Abstract

How to cite this paper: Lindrianasari, & Kuncoro, E. A. (2024). Internal auditors' artificial intelligence capabilities and sustainable competitive advantage. *Corporate & Business Strategy Review*, 5(1), 38–44. <https://doi.org/10.22495/cbsrv5i1art4>

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ISSN Online: 2708-4965

ISSN Print: 2708-9924

Received: 12.09.2023

Accepted: 05.01.2024

JEL Classification: L00, M42, O10

DOI: 10.22495/cbsrv5i1art4

The aim of this research is to provide empirical evidence regarding the influence of internal auditor capabilities in artificial intelligence on sustainable competitive advantage in large companies in Indonesia. By using Porter's (1985) competitive advantage model and the resource-based view of the firm, this research uses the basic assumption of thinking that a company can only achieve sustainable high performance if the company has "superior resources" and also has "capabilities" that can drive the company to improve its performance. This research finds empirical evidence that internal auditors' ability to work with artificial intelligence can increase sustainable industrial competitive advantage. This finding also succeeded in confirming the theory of competitive advantage introduced by Porter (1985) which explains that a company's human resource capabilities can improve the company's performance higher than other companies in the same industry or market. This research contributes that as an assurance of corporate governance, accountants must improve their ability to work using artificial intelligence to improve their functions beyond just preparing financial reports.

Keywords: Artificial Intelligence, Internal Auditor, Sustainable Competitive Advantage, Automation

Authors' individual contribution: Conceptualization — L. and E.A.K.; Methodology — L. and E.A.K.; Formal Analysis — L. and E.A.K.; Investigation — L. and E.A.K.; Data Curation — L. and E.A.K.; Writing — Original Draft — L. and E.A.K.; Writing — Review & Editing — L. and E.A.K.; Visualization — L. and E.A.K.

Declaration of conflicting interests: The Authors declare that there is no conflict of interest.

1. INTRODUCTION

Currently, where the era of globalization and the Fourth Industrial Revolution (Industry 4.0) has become an inevitability, information technology is developing rapidly. Various kinds of technology, one of which is artificial intelligence (hereinafter referred to as AI) is increasingly being created to facilitate human work. Along with technological

developments that make human work easier, there is also concern that human work can be completely taken over by technology or AI so that it will have consequences for reducing or even stopping human function as workers. The "artificial intelligence vs. human" debated by academics and practitioners, covering many controversial issues related to the prospects of some future jobs, the new skill sets and competencies needed, how humans

and machines can work together efficiently and effectively, and so on (Stancheva-Todorova, 2018).

Currently, data mining/data science-powered AI is increasingly being used in various types of industries. Companies that focus on consumer management, retail, finance, communications, and marketing are companies that have a high need for the use of “tools” to track transactional data in determining prices, customer preferences, product positioning, sales impact, and customer satisfaction, in order to increase company profits. These characteristics ultimately motivate the need for sophistication of information technology to ensure companies make real-time and relevant decisions. AI is the answer to success in winning the industry competition.

AI is a tool that has been adopted and used in the accounting profession for decades. The recent attention to artificial intelligence seems to disturb many human-dominated work cultures. The current business and operating environment is in competition to adopt and respond to digital technology developments through the adoption of computers/machines. However, once the accounting profession has been around for decades, however, it is gaining attention recently as today’s business and operating environment embraces digital technology through the adoption of computers/machines.

The challenge facing today is that these AI developments have been misunderstood and over-claimed. There is some agreement that substantive advances have been made in recent years and subsequent adoption in deep learning with advanced machines that can process much faster in larger storage spaces. This condition is expected to partially automate labor intensity. Meanwhile, Sutton et al. (2016) explained that researchers in accounting and management information systems have great potential in AI. Due to this development, the future role of the auditor will also develop in line with the application of AI in companies (Issa et al., 2016).

The use of artificial intelligence in accounting assignments is nothing new. Previously, accountants have worked with a wide variety of software that supports financial record-keeping in many types of industries. Sutton et al. (2016) explained that although there has been a slight development in automation in accounting since the 1990s, research in the area of artificial intelligence in the accounting discipline has steadily increased over the past 30 years. The study conducted by Gray et al. (2014) investigated the research productivity of expert systems and artificial intelligence in accounting. This research is one of the beginner studies in the field of accounting studies that examines AI. Gray et al. (2014) concluded that the research and practice of using expert systems/artificial intelligence has declined since the late 1990s. Therefore, accounting research that examines artificial intelligence is something that is very interesting and awaited. Multidisciplinary research will enrich the resulting information.

The research aims to find empirical evidence on the company’s internal auditors’ ability to use high technology (artificial intelligence) in completing their duties in the company. Meanwhile, the main research question of this study is whether it is true

that the ability to work with artificial intelligence of internal auditors will increase the company’s sustainable competitive advantage. As it is known, the internal auditor’s job is to ensure the functions that have been designed in the company can run according to the rules. This study wants to make a practical contribution to the ability of internal auditors to maintain a sustainable competitive advantage; and whether when internal auditors are able to respond and adapt to AI developments, the company’s sustainable competitive advantage will be even better. The main contribution presented in this research is that this research contributes that as an assurance of corporate governance, accountants must improve their ability to work using artificial intelligence to improve their functions beyond just preparing financial reports. Through the results of this research, policy contributions are offered related to the need for a reliable accounting information system team in the company to achieve a sustainable competitive advantage.

This paper is written with a structure that is generally applicable in writing scientific papers. After presenting the abstract and introduction, Section 2 will present a literature review. The research framework in Section 3 will explain the type of data used and the size of the research variables. Hypothesis testing tools will be explained in this section. Next, this paper will discuss the test results in Section 4 and discuss these findings in Section 5. At the end of the article, in Section 6, this paper will provide conclusions and research suggestions.

2. LITERATURE REVIEW

The competitive advantage adopted by business and academia today is the brainchild of Michael Porter in his book on competitive advantage in the 1980s. Porter views the company from a unique way, where the company is a series of interrelated activities known as the “value chain”, whose ultimate goal is to create a competitive advantage for the company. This concept eventually became known as “competitive advantage”. On the concept of competitive advantage, Porter (1985) argues that companies can generate competitive advantage by providing more value to buyers in the form of lower costs (low costs) compared to their competitors. Competitive advantage will also be achieved through unique operations that their competitors do not have, so as to create added value (Bashir & Verma, 2017).

Wernerfelt (1984) and Barney (1991) developed a model that describes the problems associated with identifying the items that make up an organization’s competitive advantage. This model is popularly known as the “resource-based view (RBV) of the firm” (Srivastava et al., 2013; Krakowski et al., 2023; Chatterjee et al., 2021). Using organizational theory and the RBV, Chatterjee et al. (2021) developed a model to formulate the relationship to the successful adoption of artificial intelligence-based customer relationship management (AI-CRM) at the business-to-business (B2B) level. This model predicts that companies can only produce sustainable high performance if they have “superior resources” and

sustainable “capabilities” so as to protect the company from changes that occur in the future. Barney (1991) surmises that to create a true cost advantage or differentiation, a firm must have the resources and capabilities. Porter (1985) describes competitive advantage as the ability possessed by a company through characteristics and resources that have a higher performance compared to that of other companies in the same type of industry or market. Meanwhile, Hitt et al. (2017) explain that sources of sustainable competitive advantage have the characteristics of capabilities, such as: 1) valuable, 2) rare, 3) expensive to imitate, and 4) cannot be replaced. These four capabilities will form the core competence of a company.

Using the criteria developed by Porter (1985), competitive advantage includes: First is valuable, where resources are used through a series of strategies that will increase the efficiency or effectiveness of these resources. Companies that can take advantage of this valuable resource will outperform their competitors and be able to reduce their competitive weaknesses. The second is a rarity, where resources are hard to find, unique, and cannot be found by other companies. The third is imperfectly imitable, that is, when the resources owned are very difficult to imitate, it is possible sustainably because, without large investments from limited resources, competitors find it difficult to enter the market. The last one is non-substitutable, that is when a resource has no real equivalence that is neither rare nor inimitable.

High technology (hi-tech) is a valuable item. If hi-tech is designed according to industry needs, then the hi-tech adopted by certain companies is not only valuable but also imperfectly imitable and non-substitutable. Hi-tech in the form of AI will provide a competitive advantage for every organization that adopts it. Hi-tech, which has facilitated corporate culture since the 21st century, has made the industry work more innovatively and collaboratively, which can then be leveraged to create new market opportunities. In addition to creating new market opportunities (marketplace), the use of high technology can also create barriers to competitors' entry, so that the company's products can create their own market. Qualitative and quantitative assessments are made to assess how the efforts made by company leaders, divisions related to value creation (such as human resource management), organizational culture, design, and implemented systems, together can create a more dynamic and responsive organization. superior (Srivastava et al., 2013).

AI has changed the function of corporate activities to be cost-effective and efficient. Artificial intelligence is rapidly changing the way things work in all industries. In the Big 4 audit firm, AI has been implemented in audit procedures (Kokina &

Davenport, 2017). Longinus Chukwudi et al. (2018) examine the effect of AI on the performance of accounting operations in accounting firms in Southeastern Nigeria. Using 185 accountants and managers working in accounting firms, their study found that expert systems and intelligent agents have a significant influence on the performance of the accounting function in firms in Southeastern Nigeria. A study by Cooper et al. (2019) investigates the implementation of robotic process automation (RPA) software in firms by interviewing RPA leaders in Big 4 companies. RPA software automates data input, processing, and output to streamline mundane and repetitive tasks. Many of the results of the study by Cooper et al. (2019) found empirical evidence unique to accounting. Among them is the enormous increase in efficiency and effectiveness of the implementation of RPA. However, the implementation of RPA does not affect the cost of services offered by the accounting firm, although there are concerns that clients may want reduced costs due to reduced service hours (time) provided by employees. Research conducted by Cooper et al. (2019) is initial research that investigates the issues: benefits, opportunities, and challenges of implementing RPA in the accounting field, and this research ultimately becomes a reference for further research. Based on a review of the theory and previous research described above, the hypothesis of this study is formulated as follows.

H1: Auditors' artificial intelligence (AI) capabilities enhance the industry's sustainable competitive advantage.

3. RESEARCH FRAMEWORK

This study uses primary data with respondents coming from all accountants and auditors who work in various industries in Indonesia. The moment of obtaining the sample was when the Indonesian Auditor Association seminar was held on May 1, 2021, online. Questionnaires were distributed to seminar participants using the Google Forms application. This research instrument was developed using the measurements that have been done by previous researchers. Measurement of sustainable competitive advantage using Hitt et al. (2017), while the measurement of artificial intelligence using Zhang et al. (2020). Table 1 describes the research variables and their measurements. The Google Forms questionnaire was distributed to respondents for approximately 17 weeks. The collected responses were coming from 169 accountants who work as internal auditor in companies in Indonesia and whose responses are recorded in the Google Forms tabulation.

Table 1. Research variable measurement

No.	Variable	Technology	AI supporting applications
1.	Artificial intelligence (AI) (Zhang et al., 2020)	Natural language processing	Nuance security suite
			Cortana
			Alexa
			AlphaSense
		Machine deep learning	TensorFlow
			Kensho
			Microsoft Cognitive Services
		Artificial general intelligence	SkyMind
			IBM Watson
Accenture myWizard			
		Clarify	
No.	Variables	Dimensions	Indicators
2.	Sustainable competitive advantage (Y) (Hitt et al., 2017)	1. Valuable capabilities (the ability to help companies to neutralize threats or take advantage of opportunities)	1) Affiliation 2) Good governance
		2. Rare capabilities	1) Expertise 2) Values and culture 3) Company reputation
		3. Costly-to-imitate capabilities	1) Information technology 2) Organizational atmosphere
		4. Non-substitutable capabilities	1) Specific capabilities 2) Strategic planning
		5. Organizational responsiveness	1) Organizational response to external changes 2) Focus on changing consumer needs 3) Exchange of knowledge between individual organizations
		6. Service differentiation and innovation	1) Service differentiation 2) Service innovation
3.	Auditors' age (MilAge)	Auditor's age when the survey was conducted	2 = millennial (25-40 years old) 1 = others

This study uses 7 (seven) Likert scales to measure auditors' understanding of AI and the sustainable competitive advantage of the firms in Indonesia. The middle-value option was removed to avoid ambiguity in the auditors' answers to their understanding of AI (tends to be 1 = Very weak or 7 = Very strong). The research data was processed using multiple regression, with the econometric model used as in the following equation:

$$Y = \alpha + \beta_1 AI + \beta_2 MilAge + \varepsilon_i \quad (1)$$

where,

Y = Sustainable competitive advantage (SCA);

α = Constant;

$\beta_1, \beta_2, \beta_3$ = Coefficient;

AI = Artificial intelligence;

MilAge = Millennial age;

ε_i = Error term.

4. RESEARCH RESULTS

As the research is using multiple regression analysis, a normality test for the data obtained from the respondents is required before doing further analysis. The normality test that has been done showed that the data is normally distributed with a Monte Carlo significant value of 0.202, which is higher than 0.05. This research also conducted a validity test to assess the validity of the instruments used to measure research variables. The results of the validity test show that overall the research instrument has an r-value that is greater than the r-table of 0.150. These results indicate that the research instrument is valid for measuring research variables.

This research also conducted a reliability test (Cronbach's alpha test). The decision used is that the closer Cronbach's alpha is to 1, the higher the internal consistency reliability. Apart from that,

test results can be said to be reliable if Cronbach's alpha is > 0.6. The test results show that all the instruments used produced Cronbach's alpha of > 0.6. These results indicate that this research instrument is considered reliable as a data collection tool in accordance with the concept intended and developed in this research.

The 169 respondents obtained were classified as internal auditors who work in companies in Indonesia. The industries of this research respondents are banking, insurance, financial companies, start-ups, plantations, state institutions and ministries, regional governments, universities, hospitals, trusted advisory consultants, sharia-based companies, general companies, accounting firms, and trading companies. The final number of companies used in this paper was 106. There were respondents who came from the same company's internal auditors. 49.7% of the respondents are considered millennial accountants, and the rest (50.3%) of respondents are non-millennial aged. From the answers of the respondents, to the 11 questions regarding the understanding of AI technology of the respondents, most of the respondents are familiar with and have a good understanding of the 11 AI-supporting accounting applications asked in the questionnaire. Yet, the applications they mastered were mostly still Atlas and Microsoft Excel, ACL and Idea. While for the 23 questions related to the SCA, most of the respondents believed that their firms have provided and practiced auditing services that fulfilled the elements of SCA for their clients with the capabilities of valuable capabilities, rare capabilities, costly-to-imitate capabilities, non-substitutable capabilities, organizational responsiveness, and service differentiation and innovation.

Tables 2 and 3 show the model tests used in this research. The model test is intended to assess the fitness of the model so that it is suitable for use and testing for each formulated hypothesis.

Table 2. Model summary

Model	R	R-square	Adjusted R-square	Std. error of the estimate	Change statistics				
					R-square change	F-change	df1	df2	Sig. F-change
1	0.589	0.346	0.336	20.09457	0.346	32.864	3	186	0.000

Model summary test obtained that the value of the F-significant change from the proposed research model was 0.000. This value indicates that the model formulated in this study has a significant relationship with the dependent variable (fit model).

The R-square value of 0.346 can be interpreted that Artificial intelligence and the Millennial age have a positive effect on the Sustainable competitive advantage by 34.6%, while 65.4% is influenced by other variables.

Table 3. Coefficients^a

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. error	Beta		
1	Constant	57.301	6.712		8.537	0.000
	AI	0.876	0.089	0.586	9.873	0.000
	MilAge	0.260	0.458	0.034	0.568	0.571

Note: a. Dependent variable: Sustainable competitive advantage.

From the regression test (Table 3) that explains the impact of the independent variables which are *Artificial intelligence* (X_1), and *Millennial age* (X_2) towards the dependent variable which is *Sustainable competitive advantage* (Y), the regression model could be formed as follows:

$$Y = 57,301 + 0,876AI + 0,260MilAge \quad (2)$$

The significant value of AI, which is 0.000, could interpret that AI has positive and significant impacts on sustainable competitive advantage. The control variable, which is the Millennial age, is considered to have a positive yet not significant effect on the dependent variable.

5. DISCUSSION

Therefore, based on the analysis results, the hypothesis of the research which states that internal auditors' artificial intelligence capabilities enhance the industry's sustainable competitive advantage, is proven to be accepted. This result is also in line with the previous research done by Longinus Chukwudi et al. (2018), which examines the effect of artificial intelligence on the performance of accounting operations in Southeastern Nigeria. It was found that expert systems and intelligent agents have a significant influence on the performance of the accounting function of firms in Southeastern Nigeria. Research conducted by Krakowski et al. (2023) asks the question of how AI adoption affects sources of competitive advantage. The researchers examined the resource dynamics triggered by the application of AI. Similar to the theory we use in this research, Krakowski et al. (2023) emphasized that the traditional RBV is still relevant in the issue that it is still important for humans to contribute sustainable cognitive abilities. The presence of AI has indeed substantially changed human ways, but this development which continues to challenge expands theoretical assumptions so that humans adopt these technological changes to maintain their competitive advantage to become actors in each of these changes. Chatterjee et al. (2021) offers ideas to top management of organizations to achieve and maintain competitive advantage through the adoption of technology that can encourage sustainable organizational performance.

This finding shows that the ability of accountants in carrying out their duties as internal auditors can encourage sustainable competitive advantage. Where, accountants who can respond and adapt to changes in information technology will strengthen the application and utilization of technology in the companies where they work. Therefore, it is very reasonable, that when internal auditors can work with AI, the company will achieve a competitive advantage compared to other companies (and vice versa). This finding also confirms the theory introduced by Porter (1985) about competitive advantage, in which the capabilities obtained through the characteristics and (human) resources of a company can increase the company's performance higher than other companies in the same industry or market. However, this study did not find any influence of millennial internal auditors (aged between 25–40 years old) on the achievement of corporate SCA. Kuncoro et al. (2023) found that external auditors' capabilities are not determined by age. These findings suggest that it is necessary to consider other factors that are contingencies between the two variables.

The ability of internal auditors to integrate new technologies such as big data, machine learning, AI, and blockchain in their field of work will bring major changes to the accounting profession. Zhang et al. (2020) explain that major changes in accounting work will occur when accountants (including internal auditors) use high technology (such as reengineering accounting procedures), reduce errors and distortions of accounting information generated, increase the efficiency of presenting accounting reports, and promote the transformation of the accounting career structure. This capability is also, at the same time, responding to future challenges that the accounting profession will not disappear when information technology takes over the company's business processes. Because the task of accountants develops and transforms into governance advocates, especially for corporate finance. The importance of capabilities in artificial intelligence to achieve SCA because capabilities in AI in talent management will support human resource practices (Hussain et al., 2023; Alnamrouti et al., 2022), accelerate the accuracy of interactions in B2B (Chatterjee et al., 2021), strengthen the contribution of company management

(Krakowski et al., 2023), improving the performance of internal auditors (Kuncoro et al., 2023), increasing human creativity (Salami, 2018). Research in hospitality shows that the use of AI has been shown to improve hotel performance and help them achieve competitive advantage (Hussein Al-Shami et al., 2022), and research in the area of big data analytics capability strengthens innovation in adopting the environment in design so that it can increase commercialization and encourage sustainability (Zhang et al., 2020). All the studies above show that AI capabilities in all lines of work can guarantee sustainable competitive advantage.

6. CONCLUSION

This study finds empirical evidence that the ability of the company's internal accountants to use hi-tech in their work will encourage companies to have a sustainable competitive advantage. This research is very useful in the issue of AI, which is a trending topic in business, especially in developing countries. This research provides preliminary findings on the study of AI and the role of auditors. This finding also confirms the statement about whether the accounting profession will disappear and be replaced by AI. The ability of accountants to work using hi-tech actually makes accountants improve their function as assurances of governance that

ensures the company's operations run well, compared to just preparing financial statements. This study itself did not find any significant role for millennial accountants in encouraging SCA in companies. Work experience in a company can have a big influence on accountants to master activities that encourage business competitiveness. However, the existence of millennial accountants has a positive influence on SCA.

The limitations faced in this research are because the research uses primary data obtained from participants in online internal auditor seminars (webinars). This method has the strength of being easy to obtain a response rate, but the weakness is that the person filling out the instrument (e-questionnaire) may not be the internal auditor who is the target of this research even though the participants who attend are required to be internal auditors due to weak supervision in the webinar. Apart from that, measuring artificial intelligence capabilities also uses Zhang et al. (2020) and sustainable competitive advantage using Hitt et al. (2017). Future researchers can use other measures of artificial intelligence capability that may be more appropriate and primary data obtained from onsite seminars so that it can be ensured that those who fill out the questionnaire are the target respondents.

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