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trn:oid:::3618:142100657

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Journal of Current Studies in SDGs
Homepage : https://journal.i-ros.org/index.php/JOCSIS
Email : jocsis@i-ros.org

e-ISSN 3089-7564
Vol.3, No.3, September 2027

Does Accounting Information Systems (AIS) Important for MSMEs? Case Study on MSMEs in Yogyakarta Towards SDG8

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DOI : https://doi.org/10.63230/jocsis.3.3.301

Sections Info

Article history:
Submitted: February 4, 2026
Final Revised: April 12, 2026
Accepted: June 3, 2026
First Available Online: July 25, 2026
Publication Date: September 27, 2027

Keywords:
Accounting Information Systems;
Digital Transformation;
Micro Small and Medium Enterprises;
Sustainable Development Goals;
Technology Adoption; Yogyakarta

ABSTRACT

Objective: *The study aims to examine the implementation and development of Accounting Information Systems (AIS) in Micro, Small, and Medium Enterprises (MSMEs) in Yogyakarta and identify factors influencing AIS adoption to support sustainable economic growth aligned with Sustainable Development Goal (SDG) 8.* ***Method:*** *The research employed a qualitative approach using a multi-case study method involving three MSMEs representing micro, small, and medium business categories. Data were collected through in-depth interviews, observations, documentation, and literature studies. The data analysis followed an interactive model consisting of data reduction, data display, and conclusion verification.* ***Results:*** *The findings reveal differences in AIS implementation among MSMEs based on business scale and organizational resources. Micro businesses still rely on manual accounting systems due to limited financial resources, inadequate human resource competencies, and insufficient technological infrastructure. Small businesses have adopted digital AIS through external software providers, while medium businesses have developed integrated AIS using internal developers. AIS implementation provides benefits including improved financial information accuracy, operational efficiency, internal control, and strategic decision-making capabilities.* ***Novelty:*** *The study contributes empirical evidence regarding the different stages of AIS adoption among MSMEs and highlights the importance of aligning technological capability, financial readiness, and human resource development to achieve sustainable digital transformation. The findings support SDG 8 by strengthening MSME competitiveness and promoting inclusive economic growth through technology-based management systems.*

INTRODUCTION

The study of accounting information systems (AIS) continues to grow along with the rapid development of digital technology in business. AIS is defined as a computer-based system that processes financial information and supports decision-making processes and organizational control. Nicolaou et al. (2000) stated that AIS plays an important role in improving organizational coordination and control through the availability of relevant accounting information. Furthermore, AIS contributes to improving decision-making processes, accounting information quality, performance evaluation, internal control, and facilitating business transactions (Nicolaou et al., 2000; Fitriyah, 2016). The motivation for implementing AIS in Micro, Small, and Medium Enterprises (MSMEs) is mainly related to improving operational efficiency, reducing costs, and supporting business growth (Levy & Powell, 2005; Harindranath et al., 2008).

The issue of AIS adoption in MSMEs has attracted considerable attention because MSMEs play an important role in supporting economic growth, particularly in developing countries. Ibrahim et al. (2020) emphasized that AIS adoption in SMEs is an important component in improving business management capabilities and strengthening organizational performance. In Indonesia, MSMEs represent approximately 99.9% of total business units, reaching around 62.9 million units, contributing approximately 60% to gross domestic product and absorbing 97% of the workforce (Kemenkop-UKM, 2018). Indonesian MSMEs have also demonstrated resilience by surviving and contributing to economic recovery during several economic crises, including the monetary crises of 1998 and 2008, as well as the COVID-19 pandemic period.

However, MSMEs often encounter various challenges in business development, including limited educational backgrounds, inadequate understanding of information technology, and difficulties in preparing financial reports (Muchid, 2012). Financial reporting practices among MSMEs frequently rely on cash-based recording systems, which may not accurately represent the actual financial condition of the business (Tatik, 2018). The complexity of conventional financial reporting processes can be addressed through the utilization of digital technology-based AIS, which enables more systematic, accurate, and efficient financial management.

Currently, AIS has become an important resource for MSMEs because it supports effective decision-making, business planning, and financial control. However, previous AIS studies among MSMEs have predominantly employed quantitative approaches and have not sufficiently differentiated MSMEs based on business scale, even though micro, small, and medium enterprises possess different organizational resources and technological capabilities. Consequently, AIS adoption patterns among these three categories may vary significantly. Previous studies conducted by Kholid et al. (2020), Latifah et al. (2020), Juita (2016), Meiliana and Dewi (2015), Salehi et al. (2010), and Venkatesh et al. (2003) have examined AIS adoption factors; however, these studies have not comprehensively described how AIS is implemented across different MSME categories.

The Special Region of Yogyakarta is one of Indonesia's provinces with a strong MSME sector, particularly dominated by micro and small enterprises. The development of vocational education, strong community culture, high creativity, and availability of relatively affordable raw materials contribute to the growth of MSMEs in this region. Therefore, this study analyzes AIS implementation among MSMEs in Yogyakarta by selecting informants representing micro, small, and medium enterprises based on the latest MSME classification according to Government Regulation No. 7/2021. The objective of this research is to reveal the implementation and development of AIS in MSMEs with different business characteristics.

RESEARCH METHOD

This research was conducted on MSMEs in Yogyakarta using a qualitative approach with a case study method. A case study approach was selected because it enables researchers to explore phenomena in depth within their real-life contexts. Yin (2018) explained that case study research is appropriate for investigating contemporary phenomena where the boundaries between the phenomenon and its context are not clearly evident. Therefore, this approach allows researchers to obtain comprehensive insights into the implementation and development of Accounting Information Systems (AIS) within different MSME categories.

The research objects consisted of three companies representing different MSME categories: one micro enterprise, one small enterprise, and one medium enterprise. The selection of these three companies was based on the consideration that micro, small, and medium enterprises have different organizational resources, technological capabilities, and managerial characteristics, which may influence the adoption and implementation of AIS. The research objects were selected according to the latest MSME classification criteria based on Government Regulation No. 7/2021 to ensure representation of micro, small, and medium enterprises.

The data sources in this study consisted of interviews, researcher participation, documents, and direct observations of relevant participants. In-depth interviews were conducted with informants through natural interactions similar to daily conversations while maintaining focus on the research objectives. Although the interviews were not fully structured, the researchers prepared an interview guide as a reference to ensure that the discussion remained aligned with the research topic. The validity and reliability of qualitative data were maintained through data triangulation, increased research persistence, and peer discussions (Sugiyono, 2014).

The qualitative data analysis process followed the interactive model proposed by Miles and Huberman (1992), which consists of data reduction, data display, and conclusion drawing/verification. This analytical approach was applied continuously throughout the research process to obtain meaningful interpretations regarding AIS implementation, challenges, and development strategies among MSMEs.

Table 1. Interview guide

No	Aspects That Will Be Explore	Item
1	MSME Owners' awareness of the importance of AIS	Do MSME owners realize the importance of AIS for developing their business?
2	Latest implementation of AIS for MSMEs	- How is AIS implemented in informant MSMEs? - Is it manual or digital based? - Who designed and operates AIS? - Does the implemented AIS meet the company's needs? - What are the weaknesses of AIS in informant MSMEs?
3	Obstacles or Advantages of AIS Implementation	- Are there any obstacles in implementing AIS for informant MSMEs? If there are obstacles, what are the obstacles? - If there are no obstacles, what are the advantages of implementing AIS in the informant MSMEs?
4	AIS's future development plans	What are AIS's future development plans?
5	The benefits of AIS for companies	- Has the implemented AIS provided benefits for the business? - What are the expected benefits from future AIS development?

The researchers were actively involved as companions within the MSME community where the informants were members, which facilitated the data collection process and enabled researchers to build closer relationships with participants. This involvement allowed researchers to obtain richer and more contextual information regarding the implementation of Accounting Information Systems (AIS) in MSMEs.

Referring to Sugiyono (2014), the validity and reliability of qualitative research data can be maintained through several techniques, including increasing research persistence, triangulation, and peer discussions. In this study, data credibility was ensured by applying these validation techniques throughout the research process. Furthermore, qualitative data analysis was conducted using the interactive model developed by Miles and Huberman (1992), which consists of data reduction, data display, and conclusion drawing/verification. This analytical process was carried out continuously during the research to obtain comprehensive interpretations of AIS implementation, challenges, and development strategies in MSMEs.

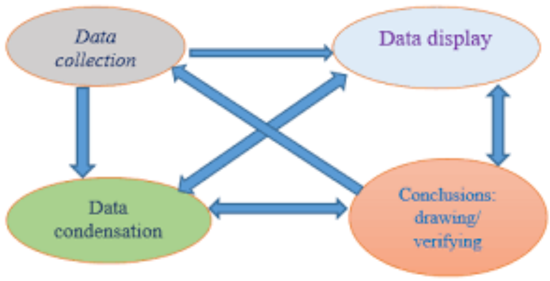

Figure 1. Miles & Huberman interactive analysis

RESULTS AND DISCUSSION

Results

The object of this research consists of 3 companies, namely the EKF company which is a micro business, the IKP company which is a small business and the DH company which is a medium business. The selection of the three research informants took into account business criteria according to PP No. 7 of 2021 concerning Micro, Small and Medium Enterprises (MSMEs) replaces the 2008 MSME Law. Below is a comparison of MSME criteria between the 2008 MSME Law and PP No. 7 of 2021:

Table 1. Interview guide

MSME Law of 2008	PP MSME No. 7 of 2021
MSME criteria: MSMEs are classified according to net worth or annual sales results. Net worth is the amount of assets after deducting debts or liabilities.	**MSME criteria:** MSMEs are classified according to the criteria of business capital or annual sales results. Business capital is own capital and loan capital to carry out business activities.
Net Worth/Business Capital: 1. Micro business Maximum IDR 50,000,000 2. Small business More than IDR 50,000,000 – maximum IDR 500,000,000 3. Medium Business More than IDR 500,000,000 – maximum IDR 10,000,000,000	**Net Worth/Business Capital:** 1. Micro business Maximum IDR 1,000,000,000 2. Small business More than IDR 1,000,000,000 – maximum IDR 5,000,000,000 3. Medium Business More than IDR 5,000,000,000 – maximum IDR 10,000,000,000
Annual Sales Results: 1. Micro business Maximum IDR 300,000,000 2. Small business More than IDR 300,000,000 – maximum IDR 2,500,000,000 3. Medium Business More than IDR 2,500,000,000 – maximum IDR 50,000,000,000	**Annual Sales Results:** 1. Micro business Maximum IDR 2,000,000,000 2. Small business More than IDR 2,000,000,000 – maximum IDR 15,000,000,000 3. Medium Business More than IDR 15,000,000,000 – maximum IDR 50,000,000,000

According to Table 1, the latest classification of MSMEs is based on Government Regulation of the Republic of Indonesia No. 7 of 2021 concerning MSMEs. Micro enterprises are defined as businesses with capital ownership (excluding land and buildings) of a maximum of IDR 1 billion or annual sales of a maximum of IDR 2 billion. Small enterprises are businesses with capital ownership of more than IDR 1 billion up to IDR 5 billion or annual sales of more than IDR 2 billion up to IDR 15 billion. Meanwhile, medium enterprises are businesses with capital ownership of more than IDR 5 billion up to IDR 10 billion or annual sales of more than IDR 15 billion up to IDR 50 billion.

One of the important resources supporting MSME development is the Accounting Information System (AIS), which provides benefits for effective decision-making, business planning, and organizational control. Ibrahim et al. (2020) emphasized that AIS is an essential component of management control systems because it supports internal decision-making processes and provides information that can be used as a basis for developing managerial strategies in MSMEs.

The adoption of information technology and information systems has become an integral part of AIS implementation. Several theoretical models have been used to evaluate technology-based AIS adoption. The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al. (2003), integrates various psychological and sociological theories to explain user acceptance and technology adoption behavior. In addition, the Technology Acceptance Model (TAM) has been widely applied to examine factors influencing information technology adoption (Salehi et al., 2010). Furthermore, Chen and Hamdan (2014) introduced the TIME model (Training, Infrastructure, Money, and Employee) as a framework for understanding information technology adoption among SMEs, highlighting that training, technological infrastructure, financial capability, and employee competence are important factors influencing successful system implementation.

Figure 1. Time model

Based on Figure 2, the TIME model consists of four key factors influencing information technology adoption: Training, Infrastructure, Money, and Employees. Financial resources play an important role in technology adoption because the availability of funding determines an organization's ability to provide technological infrastructure, acquire appropriate systems, conduct employee training, and retain competent personnel responsible for managing the system. The implementation and sustainability of information systems depend on sufficient financial investment to support system development, infrastructure improvement, and human resource capacity building. Furthermore, employee readiness and loyalty are also influenced by organizational support, including appropriate compensation, incentives, and opportunities for competency development (Chen & Hamdan, 2014).

This research aims to examine the implementation and development of Accounting Information Systems (AIS) among MSMEs in Yogyakarta. Although AIS can initially be implemented using manual procedures, technological advancement has transformed AIS into a computer-based system that processes financial information and supports decision-making, organizational coordination, and managerial control. Nicolaou et al. (2000) explained that AIS effectiveness is closely related to its ability to provide relevant information for organizational coordination and control processes.

To maintain research ethics, the identities of informants and company names in this study were anonymized. The selected informants represented three MSME categories, consisting of one micro enterprise, one small enterprise, and one medium enterprise, allowing the research to explore differences in AIS implementation based on organizational scale and available resources.

Table 3. Details of informations

Business Criteria	Company	Number of Employees	Annual Turnover	Informant	Informant Position
Micro	EKF	14	1.8 M	Mrs. Eka	Owner
				Mr Rizal	Owner
Small	IKP	10	2.5 M	Mr. Ardi	Owner
				Mrs. Desi	Accounting Staff
				Mrs. Tias	Accounting Manager
Intermediate	DH	355	48 AD	Mr. Muda	Owner
				Mrs. Tini	Leader

Discussion

Micro business – EKF

Background and scope of EKF's business. EKF is a company engaged in commodity sales which was founded in 2017 in the City of Yogyakarta. EKF's superior product is organic rice with various types, including brown rice, black rice, brown rice, diabetic rice and diet rice. The owner of EKF, Mrs. Eka, Pak Rizal's wife, worked at the Rumah Sehat Clinic and concluded that various health problems arise from diet, so she was motivated to sell organic rice. EKF collaborates with 30 local farmers who are gathered in an organic farmers association and have been certified. The average turnover per year is around 1.8 billion rupiah, and there are 14 employees. Marketing is mostly done online through various social media, market places and websites. Customers consist of 55% distributors and 45% factories who repackage EKF products for resale.

Awareness of the Importance of AIS. Mrs. Eka said that EKF's business processes are not the same as trading companies, but also not completely like manufacturing companies. EKF guides farmers to plant organic rice, then EKF buys the organic rice harvested by these farmers and packages it for sale. The rice purchased from farmers is rice that has standard quality set by EKF. The uniqueness of this business process provides its own challenges in designing the accounting system at EKF. Mrs. Eka, as the owner of EKF, believes that AIS is very important for her company.

> “EKF tends to be more like a manufacturing companyyes... In my opinion, an accounting system is very important for a manufacturing company like us. That's why we need a system that connects all parts, especially production, finance and accounting."(Mrs. Eka, Owner of EKF).

In the researchers' observations, what is meant by the production section at EKF is the Warehouse function, which carries out the process of receiving rice from suppliers (farmers), putting the rice into packaging and then labeling the packaging.

Mrs. Eka once studied at the Accounting Department, although she has not completed her studies to date. He decided to focus on business. He gained an understanding of accounting information systems from college. Mrs. Eka also actively participates in various kinds of financial training and workshops.

"...financial reports make us understand business conditions... Unfortunately, many of our friends whose businesses are already big don't have financial reports. Suddenly the money ran out, I was confused about where the money went..."(Mr Rizal, Owner of EKF).

Even though Mr. Rizal has a chemistry degree, he understands the importance of financial reports produced from accounting information systems. He often also takes part in financial training workshops with his wife, Mrs. Eka.

"Managing money in business is based on financial reports, sis..." (Mrs. Eka, Owner of EKF).

A common understanding between husband and wife who are involved in joint business management in MSMEs is very important, so that the business development strategy also reaches agreement between the business owner couple. This is because MSME owners are a central factor in developing MSME businesses, in contrast to medium or large businesses which generally have more complete management teams and human resources.

Accounting System at EKF. Currently, EKF carries out accounting records and bookkeeping manually using Microsoft Excel. There are 3 staff in charge of managing the financial and accounting system. One staff is tasked with managing finances, one staff is tasked with compiling financial reports and one staff is tasked with analyzing financial reports and designing system development.

“The cash manager's educational background is vocational school, the others have a bachelor's degree.” (Mrs. Eka, Owner of EKF).

The financial staff in charge of managing cash is the staff who has been with EKF the longest. Mrs. Eka hopes that the finance staff can improve their competence so that they can become coordinators in the finance and accounting department. However, so far the financial staff's abilities have not been deemed sufficient to become coordinators, so EKF has recruited coordinators from new staff who have a bachelor's degree in accounting. The finance staff are vocational school graduates majoring in office administration and have never attended financial or accounting training from outside the company. When first joining EKF, the staff was trained and supervised directly by Mrs. Eka who had a background in accounting education. Mrs. Eka had studied accounting at a private university in Yogyakarta, but did not have time to complete her undergraduate education and chose to develop skills in finance through various non-formal workshops.

Mrs. Eka also carries out direct control over 3 staff related to the accounting system. According to Mrs. Eka, the development of knowledge and skills of finance/accounting staff is mostly carried out by the owner. One of the characteristics of MSMEs, especially micro businesses, is that they are very dependent on the skills and abilities of the business owner. The role of business owners is quite dominant in making business decisions, considering that human resources in micro businesses are still limited. This is different from large businesses that have a complete management structure, business decision making no longer depends on the owner.

"My husband or I took part in the training, then we transferred the knowledge from the training to the staff." (Mrs. Eka, Owner of EKF).

> "We also have to know what they (staff) learned during training, so we can think about it." (Mr Rizal, Owner of EKF)

The financial reports produced are Profit and Loss Report, Financial Position Report and Capital Changes Report. Meanwhile, other financial records are in the form of Daily Cash Movements and Goods Inventory. According to SAK EMKM (Financial Accounting Standards for Micro, Small and Medium Entities) standard financial reports for micro, small and medium scale businesses are profit and loss statements, financial position reports (balance sheets) and notes to financial reports. However, MSMEs are allowed to add other necessary financial reports. EKF adds a report on changes in capital to its financial statements. Researchers did not find records of the financial reports prepared by EKF.

> "The calculation of the cost of goods sold at EKF is not yet real, it still uses allocation, because it is difficult to link it to the inventory of goods." (Mrs. Eka, Owner of EKF)

Mrs. Eka's statement indicates that the manual accounting system currently implemented by the company has several limitations. The manual system is unable to provide accurate inventory information, which may affect the calculation of the cost of goods sold (COGS). Consequently, the reliability and validity of financial statements, particularly income statements, may be compromised. Decisions made based on inaccurate financial information may negatively influence business development and strategic planning. Huang et al. (1999) emphasized that information quality is a critical factor in supporting effective decision-making processes, while Clikeman (1999) highlighted that poor-quality accounting information can reduce the usefulness of financial reports for managerial purposes. Therefore, improving accounting information quality through an effective Accounting Information System (AIS) is essential for MSMEs to support accurate financial reporting and sustainable business growth.

The results of researchers' observations at EKF found that the infrastructure at EKF did not yet support the implementation of AIS. EKF does not provide AIS software for financial and accounting system managers. This is because EKF is still focused on improving the warehousing system which requires quite large funds and other resources.

> "Rehab of the warehouse, rearrangement of the layout of the warehouse, quite a lot has been used up." Mrs. Eka, Owner of EKF)

Expanding the warehouse and arranging its layout requires large costs, so the funds available at EKF are also limited. According to Mrs. Eka, EKF has also utilized funding from Sharia Financial Institutions, but these funds are allocated for inventory of merchandise. Limited funds for system development at EKF are a common occurrence in micro businesses.

Challenges of AIS Implementation and Development. Even though EKF owners are aware of the importance of AIS for business development, in reality EKF has not implemented a digital/computerized AIS. Limited human resources for AIS managers and developers are an obstacle in adopting AIS at EKF. Analyzing Mrs. Eka's statement that the development of staff knowledge and skills is carried out directly by Mrs. Eka and/or her husband, the opportunity for staff to take part in training/training related to AIS from outside the company is very small. Even though Mrs. Eka and her husband do not have adequate AIS skills. Mrs. Eka has more control over production and financial management, while her husband, Mr. Riza, has more control over digital marketing. This was conveyed by Mrs. Eka to researchers.

> “The one who manages the marketing and advertising is Mas Rizal. I'm into production and finance." (Mrs. Eka, Owner of EKF)

However, AIS's future development plans have been announced. Starting from the development of a warehousing system known as a production system at EKF, it will continue with the development of AIS next year.

> "We focus on production first, fixing the system."(Mr Rizal, Owner of EKF)

The development of warehousing and inventory systems is carried out by experts from academics - the Islamic University of Indonesia. Meanwhile, the development of the accounting information system is planned to be carried out by experts and trainers in a Financial Literacy workshop attended by Mrs. Eka.

> “We want to pull the production system into the accounting system, so that it is integrated. Next year's plans to be accompanied by Mr. S.” (Mrs. Eka, Owner of EKF)

In addition to inadequate human resource competency, limited financial resources at EKF mean that infrastructure for implementing and developing AIS is also not yet possible.

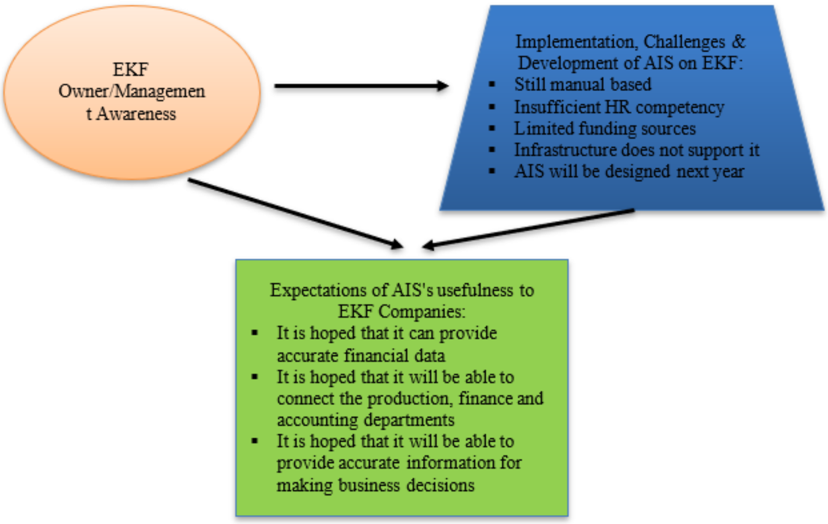

Figure 3. Owner awareness, implementation and usefulness of AIS in EKF

Figure 3 reflects research findings at EKF including how EKF owners are aware of the importance of AIS in business development, how is the current implementation of AIS at EKF and what are the challenges, and what are the plans for developing AIS at EKF. In general, EKF owners understand the importance of AIS in business development. The implementation of AIS in EKF is still manual-based and has the weakness of not being able to produce accurate financial reports. The financial reports produced are profit and loss reports, financial position reports and capital changes reports, and notes to the financial reports are not yet available. The challenges of implementing AIS at EKF are inadequate human resource competency, limited financial resources and unsupportive infrastructure. Meanwhile, AIS's development plans will be carried out next year.

As for the benefits of AIS in the future conveyed by the EKF owner are that it is expected to be able to provide accurate financial data, be able to link production, finance and accounting departments and be able to provide information for business decision making.

Small business – IKP

Background and scope of IKP's business.Starting from the concerns of mosque takmirs who were waiting for each other's call to prayer from other mosques to determine prayer times, the owner of IKP, Mr. Ardi, was motivated to provide a digital prayer schedule. At the start of the business, Mr. Ardi took digital prayer schedule products from his colleagues and resold them through offline marketing by distributing brochures. As the business develops, IKP produces its own digital prayer schedule. IKP's superior product has also increased in the form of mosque carpets. Currently marketing uses more online media, whether through websites, social media or market places. Until this year, more than 4,000 mosques from Sabang to Merauke have been served by IKP. Before the pandemic, IKP had 25 employees and branches in several cities, including Malang, Semarang, Klaten, Pekalongan and Bekasi. The Covid'19 pandemic has had a negative impact on IKP's business. Currently there are 9 IKP employees remaining, with an average turnover of 2.5 billion per year.

Awareness of the Importance of AIS. Generally, in companies on the MSME scale, the owner also holds the position of top management, so the perception of the MSME owner will influence the adoption of AIS in their business. The owner of DH also holds a strategic position in company management, namely the position of Director.

> "I need real-time financial reports, which I can monitor anytime and anywhere, so I know business and financial conditions." (Mr. Ardi, Owner of IKP).

Based on Mr. Ardi's response, it shows that AIS which is able to provide real-time financial reports is important for knowing business and financial conditions. Mr. Ardi as the owner of IKP also submitted a financial reportdashboard helicopter viewfrom his business.

> "Financial reports are like a helicopter view for business." (Mr. Ardi, Owner of IKP).

Helicopter viewis a term used in management and business that represents how to view the entire system from various aspects. Mr. Ardi admitted that he gained an understanding of the importance of financial reports when attending the workshopFinancial Literacyorganized by an MSME community. Mr Ardi said he did not understand the AIS process in the accounting software used by the accounting staff at IKP. He is a graduate of Electronics, and learned about management from various business communities and business mentors/teachers. Mr. Ardi does not have an understanding of accounting systems from a formal educational background. However, from the opinion expressed by Mr. Ardi, he noted that the financial reports produced by AIS are more effective than financial reports produced from a manual accounting system. This supports research that digital technology-based AIS improves accounting performance (Salehi et al., 2020).

> "I want the financial reports to be visible on one screen... I mean, I don't need to open individual files of profit and loss, balance sheet, so what else is that? (pause for a moment) So, that's it... The point is, I want all the reports to appear together." (Mr. Ardi, Owner of IKP).

In a follow-up discussion with Mr. Ardi, the researcher found that the financial report on one screen that Mr. Ardi meant was a summary of the financial report which contained a profit and loss report, a financial position report and a cash flow report combined into one unit. Pak Ardi got an idea of the design while attending a financial literacy workshop. Pak Ardi feels that the summary of the financial report is able to provide complete and easy to understand financial information.

Accounting Information System at IKP. At the beginning of preparing financial reports, IKP accounting staff used Excel and prepared financial reports manually. However, Mr. Ardi found it difficult to read the financial reports produced from this manual process. Then the accounting staff proposed subscribing to accounting software so that Mr. Ardi could access real-time financial reports in a standard format. This is in line with research by Sutrasno (2012) that AIS is able to provide convenience for company leaders to monitor the company's financial condition.

> "What accounting software you want to use, I'll leave it up to the staff. The important thing is that financial reports are available in real time.If you use manual, it's a hassle to monitor it." (Mr. Ardi, Owner of IKP).

IKP accounting staff decided to choose a software that can be accessed by several people, either via desktop or smartphone. Another consideration in choosing accounting software is the financial reports produced according to the company's needs, namely profit and loss reports, financial position reports and cash flow.

The costs incurred for operating AIS are also a consideration within the company. The SAP software that was used by finance and accounting managers at their previous workplace was considered very effective, but the subscription fee is not affordable for IKP at this time.

> "Using ERP is really nice, all divisions are connected in the system, and can cross-check data with each other, but the costs are really big," (IKP Accounting & Finance Manager).
> "The software subscription fee is now three hundred thousand per month, but the minimum subscription is one year," (IKP Accounting Staff).

IKP accounting staff also said that they were used to operating the selected AIS software. This Bachelor of Accounting graduate also uses this software during accounting practice courses on campus.

> "In fact, there are many free accounting software for MSMEs, for example AISPIK, SME Accounting, UMKM Finance, what else... But the output of financial reports with free software is very minimalist," (IKP Accounting Staff).

Some free software provided by agencies related to MSMEs generally only produces financial reports in the form of profit and loss reports and financial position reports in accordance with MSME financial reporting standards which refer to SAK EMKM. Meanwhile, the Accounting & Finance Manager said he needed flow reports to control business finances. The financial reports that IKF has prepared are profit and loss reports, financial position reports and cash flow reports. Meanwhile, notes to the financial reports have not been prepared by IKP. Responding to questions about why notes on financial reports were not prepared, the Accounting and Finance Manager said that specific matters in financial reports had so far been conveyed orally in coordination and not written down.

> "If there is something that needs to be explained from the financial report, we will convey it directly during coordination... Likewise for the financial report analyst, we will convey it directly too."(IKP Accounting & Finance Manager).

Regarding the development of human resource competencies for AIS managers, Mr. Ardi said that he provides equal opportunities for all staff to take part in training or workshops that suit the needs of each section. IKP Accounting Staff and Accounting & Finance Manager several times participated in financial workshops held from outside the company.

Challenges of AIS Implementation and Development.Mr. Ardi said that the accounting staff who had managed AIS several years ago decided to resign when the company experienced a financial decline during the pandemic. This has an impact on the sustainability of AIS implementation at IKP. Even though the new accounting staff also uses AIS with similar software, financial reports have not been presentedrealtimebecause currently the accounting staff is preparing financial reports several months ago which were not prepared.

> “We need financial reports for the last 3 months for the 2022 working meeting materials, but so far only the profit and loss report has been made..” (Mr. Ardi, Owner of IKP).
> “I need to pull data from several people, and do financial tasks too, so I'm overwhelmed with catching up on preparing financial reports.” (IKP Accounting Staff).

Responding to the process of manually pulling data from other divisions which took quite a long time, the IKP Finance and Accounting Manager said he was designing a special AIS for IKP in collaboration with IT vendors. The AIS software subscription used by IKP can currently only be operated by accounting staff, so data collection from the sales division, goods purchasing division and operational division is still done manually.

> "We have tested the accounting system design twice, now it is still in the revision stage. Hopefully we can use it in 2022."(IKP Finance and Accounting Manager).

In general, the challenge of implementing AIS at IKP is the turnover of accounting staff, which hinders the timely presentation of financial reports. This ultimately has an impact on the constraints of financial report analysis which will be used to design strategic decisions at company working meetings.

Meanwhile, on the AIS development side, IKP management has plans to develop an AIS that is in line with the company's needs. This is in accordance with research by Ward and Peppard (2003) that alignment of business, information technology and operational strategies is needed.

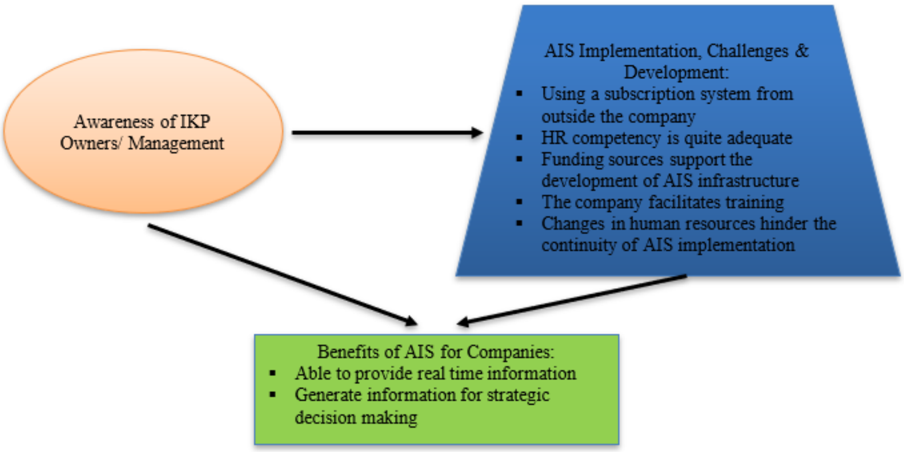

Figure 4. Owner awareness, implementation and usefulness of AIS in IKP

Figure 4 is a summary of research findings on IKP companies including how IKP owners are aware of the importance of AIS in business development, how the current implementation of AIS in IKP is and what the challenges are, and what the plans are for developing AIS at IKP. Mr. Ardi as the owner of IKP has understood the importance of AIS for business development by saying repeatedly that Mr. Ardi needs financial reports which are the results of AIS which can be accessed in real time. On the AIS implementation side, IKP has implemented digital-based AIS using subscription services from outside the company. The successful implementation of AIS is also supported by HR competency because the company provides the necessary training facilities. The challenge of implementing AIS at IKP is the change in human resources managing AIS. On the AIS development side, the IKP company plans to design the AIS according to the company's needs. The benefit of AIS for IKP companies is that it is able to provide financial information in real time and is able to produce information for making strategic decisions in business development.

Medium Business – DH

Background and scope of DH's business.DH is a company that has 40 business units. It was founded in 2016 when the owner of DH, Mas Muda, was still a student majoring in Javanese Language Education at a state university in Yogyakarta. Currently DH's turnover reaches 48 billion per year, with an average turnover of 1.2 billion per year in each business unit. Each business unit at DH sells different products or services. DH products or services include digital marketing services, branding services, financial literacy training, parenting training, honey and children's vitamins. Initial capital for all business units is provided by central management. One business unit consists of 5-20 staff with one leader. Each business unit is managed independently by a leader and is given authority to make tactical decisions, while strategic decisions are coordinated first with central management to obtain approval. Only the leader carries out formal communication and coordination with DH central management which is carried out routinely every month.

Awareness of the Importance of AIS. Although the development of information systems is a key element in supporting business (Avison, 2010), the adoption of AIS in companies is very dependent on the awareness of top management in the company. The perspective and attitudes of top management are also very important in maintaining the ability of information systems to achieve company goals (Caldeira and Ward, 2003).

The researcher asked Mas Muda, what is the importance of the accounting information system (AIS) for the DH company, and Mas Muda said that the AIS provides information on business conditions in each business unit and helps the central management of the DH company to exercise control over all business units.

> “We have 40 business units, if we don't use a system it will be a real hassle to control them.” (Mr. Muda, owner of DH).

Owner DH really understands the importance of accounting information systems in managing the company. Even though in carrying out cooperation with all business units Mas Muda emphasizes mutual trust, control over all business units is still carried out. AIS makes it easier for Mas Muda as a business owner and central management to carry out control at any time, considering that all units are in different areas so direct control through formal coordination cannot be carried out every day.

> "Just a flexible meeting, usually an appointment with Mas Muda, match time, so just meet... have coffee and chat, discuss business too." (Mrs. Tini, Unit A Leader)

Mrs. Tini, Unit A Leader at the DH company, said that informal coordination is often carried out with Mas Muda as the owner of DH. During informal coordination, Mas Muda listened a lot to business developments from the leaders and provided the necessary input. Meanwhile, to control and evaluate performance achievements, Mas Muda and the central management team utilize AIS which provides more complete financial information.

The results of the interview with Mas Muda also show the motivation for implementing AIS at DH companies, namely to increase the efficiency of staff/HR in the finance and accounting department in consolidating financial reports. This finding is in accordance with previous research by Ibrahim et al. (2020), that the motivation for using AIS in MSMEs is to increase efficiency and reduce costs.

Accounting Information System at DH**.** DH designed an accounting information system by optimizing two program developer staff. The AIS connects 40 business units owned by DH so that data collection and financial reports from all units are no longer done manually. Consolidated financial reports are prepared by 1 accounting staff using an integrated system.

> “We built this (accounting information) system ourselves, so that it suits the team's needs. There is no software on the market that fits our business model.” (Mr. Muda, owner of DH).

Mas Muda's account revealed that AIS must be in accordance with the company's needs and business model. DH did not find AIS software on the market that suited the company's needs, so the company decided to design and develop AIS through the company's internal system developer team. Mas Muda admitted that designing AIS to accommodate 40 units was not an easy thing. The system design and development team at the company repeatedly disassembled the system at great expense.

> “It's already billions, it's not a small number...(laughs).” (Mr. Muda, owner of DH).

Large investments in system infrastructure development at DH companies are expected to provide large benefits in the future. Mas Muda assesses that the billions of funds that have been used for the development of AIS in DH are comparable to the output produced. Even though with the available funds the company could ask for help from consultants from outside the company, Mas Muda chose to empower the internal developer team.

> "Look, sis, if we have an internal team, we can request changes to this and that in the system more quickly. "If it's a buying system from outside, you can't quickly ask for changes."

The system development team is provided with facilities by the company to develop competencies through various training, workshops and various other competency development activities that suit the team's needs. Mas Muda admitted that the costs for improving the skills of the system development team were also quite large. Large investments in information systems will contribute to long-term productivity and probability through appropriate training and increased skills for system users (Wynn and Maldonado, 2007).

Even though Mr. Muda as the top leader in DH management does not have the competence and background of information systems or digital technology, Mas Muda is self-taught about digital technology. Throughout the researcher's observations, Mas Muda was very open to receiving information and input from everyone. He also has a learning character that is emulated by the management team and leaders in the business units.

ChallengenAIS Implementation and Development. DH has experienced quite rapid development from year to year. Five years of business journey led by Mas Muda, has led DH to have 40 business units with more than 500 employees. The company's business model also changes following business developments, as does the accounting information system implemented by the company. AIS on DH has undergone several system overhauls.

> "The development team always says yes, if I ask, can you create a new system like this or that? So I don't take developers or software from outside. They (the internal development team) only asked for learning time if I asked for a new system." (Mr. Muda, owner of DH).

AIS at DH companies continues to be developed by the system development team by accommodating the needs of the owner and the business units under him. Even though AIS development requires relatively large costs, company management provides full support. The development of AIS at the DH company did not experience significant obstacles. According to Mas Muda, the management team at DH is mostly young people aged under 30 years.

> "They are still young, have creative minds, are learners, and adapt very quickly to technology." (Mr. Muda, owner of DH)

Central management at the DH company totals 20 people. Researchers observed that all the team at the DH company were young people with an average age of between 25 - 35 years. Team recruitment, both in central management and business units, is prioritized for young people, although Mas Muda said there would be no layoffs for older teams.

The team's recruitment of young people is not without reason. DH management hopes that a team driven by young people will be more agile in developing the business. Young people are also recognized as being more free to think, innovate and like challenges.

> "Muda boys (young people) have fresh minds, don't think much about family problems..." (Mrs. Tini, Unit A Leader)
> "Why young people? Because they don't have a heavy past burden, they don't have family debts that make their minds dull, hehehe...(Mr. Muda, owner of DH)

Based on what Mas Muda said, technology adaptation is an important factor in the implementation and development of AIS. Employees who quickly adapt to technology will support their competence to develop AIS in the company. Young people, according to the assessment of Mas Muda and DH management, have innovative thinking, like challenges and are able to adapt to digital technology-based systems quickly. This confirms the opinion of Caldeira and Ward (2003) that the competence of information systems staff is very important to maintain the ability of information systems to achieve organizational goals.

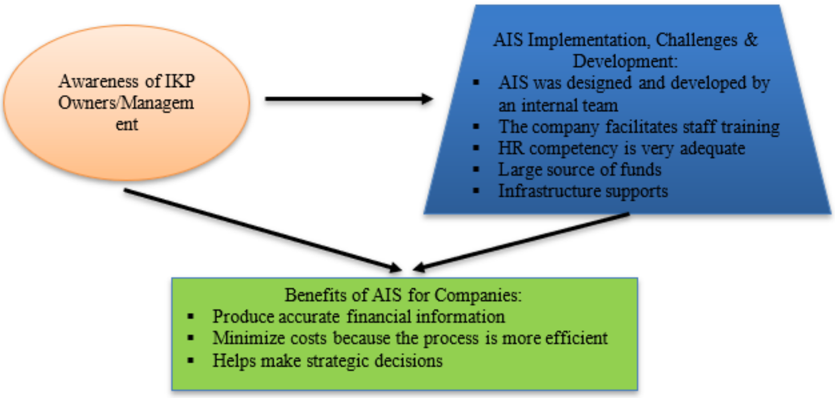

Figure 5. Owner awareness, implementation and usefulness of AIS in DH

Based on research findings from the three informant companies, namely EKF, IKP and DH, the following table presents a summary of the implementation, challenges and development plans for the Accounting Information System:

Table 4. Implementation, challenges and plans for AIS development in MSMEs

Information	Micro Business - EKF	Small Business - IKP	Medium Business - DH
Implementation of AIS	- Manual based using Microsoft Excel - Financial reports produced: Profit and Loss Report, Financial Position Report and Capital Changes Report - Financial data is inaccurate, COGS calculations do not reflect actual costs	- Based on digital technology, using AIS software subscribed from outside the company - Financial reports produced: Profit and Loss Report, Financial Position Report and Cash Flow Report - Software from	- Based on digital technology, using AIS designed by the company's internal developer team - Financial reports produced: Financial Reports per Unit and Consolidated Financial Reports - AIS is tailored to the company's business model

Information	Micro Business - EKF	Small Business - IKP	Medium Business - DH
		outside the company does not meet the owner's needs	
Aspects that Influence the Success/Failure of AIS Implementation	1. Insufficient HR competency 2. Funding sources are very limited 3. Infrastructure does not support it	1. HR competency is quite adequate 2. Funding sources are still limited 3. Infrastructure is quite supportive	1. HR competency is very adequate 2. The source of funds is quite large 3. Infrastructure supports
AIS Implementation Challenges	Limited human resource competency, funds and infrastructure)	Change of AIS management	Continuous system overhauls adapt to business developments
AIS Development Plan	Building an AIS according to business needs through experts from outside the company	Building an AIS according to business needs through experts from outside the company	AIS will continue to be adapted to business developments by the company's internal development team

Table 3 indicates the differences and implementation of AIS, aspects that influence the success or failure of AIS implementation, challenges to AIS implementation and AIS development plans in the three MSMEs. The implementation of AIS in micro businesses - EKF is still manual based with Microsoft eExcel, in small businesses - IKP has used digital technology by subscribing to software from service providers outside the company, while in medium businesses - DH has used digital technology designed by an internal system developer team company.

The failure to implement digital-based AIS in micro businesses was due to inadequate human resource competency, limited funding sources and unsupportive infrastructure. Meanwhile, in small businesses, HR competency is sufficient, funding sources are still limited and infrastructure is quite supportive. In medium-sized businesses, the success of AIS implementation is supported by very adequate human resource competency factors, sufficient financial resources and supporting information system infrastructure.

The challenge of implementing AIS in micro businesses is overcoming limitations in resources, both in terms of human resources, funding and infrastructure. Meanwhile, the challenge of implementing AIS in small businesses is the HR management. In medium-sized businesses, continuous system overhaul to adapt to business developments is a challenge in developing AIS in the future.

In the aspect of system development plans, both micro and small businesses plan to build AIS according to business needs through experts from outside the company, while for medium businesses the AIS will continue to be adjusted to business developments by a team of developers from within the company.

CONCLUSION

Fundamental Finding : This study confirms that Accounting Information Systems (AIS) play an essential role in improving MSME sustainability by providing accurate, timely, and efficient financial information to support strategic decision-making. The implementation of AIS differs according to MSME characteristics, where micro businesses remain constrained by limited resources, small businesses begin adopting

external digital solutions, and medium businesses develop integrated AIS based on internal organizational needs. These findings highlight that AIS adoption is a gradual process influenced by financial readiness, technological infrastructure, and human resource competency. **Implication :** The findings imply that strengthening MSME digital transformation requires a comprehensive approach involving technological accessibility, accounting education, employee training, and institutional support. Policymakers and business development institutions should design programs that facilitate affordable AIS adoption for smaller enterprises while encouraging innovation and productivity improvement. Through effective AIS implementation, MSMEs can enhance competitiveness and contribute to sustainable economic growth in line with SDG 8 (Decent Work and Economic Growth) and SDG 9 (Industry, Innovation and Infrastructure). **Limitation :** This study has several limitations. First, the research was conducted using a qualitative multi-case study approach involving only three MSMEs in Yogyakarta, which limits the generalizability of the findings. Second, this research did not deeply examine how AIS-generated information directly influences long-term strategic decision-making processes and business performance outcomes. **Future Research :** Future studies are recommended to expand the research scope by involving a larger number of MSMEs from different geographical regions and business sectors. Further research may also investigate quantitative relationships between AIS adoption, digital capability, organizational performance, and sustainability outcomes. Additionally, future studies can explore the influence of leadership characteristics, organizational culture, and government intervention in accelerating AIS adoption among MSMEs.

ACKNOWLEDGEMENTS

The author would like to thank Beasiswa Pendidikan Indonesia (BPI) which has provided funding support for doctoral education. The author would also like to express thanks to the informants who were willing to give up their time for interviews, as well as colleagues who had been the liaison between the researchers and the informants. May Allah reward you with more goodness.

AUTHOR CONTRIBUTIONS

Tatik contributed to the conceptualization, research design, methodology development, data collection, formal analysis, investigation, and original manuscript preparation. **Doddy Setiawan** contributed to theoretical framework development, validation, supervision, critical review, and improvement of the manuscript. **Falikhatun** contributed to data interpretation, literature review, methodological evaluation, and manuscript revision. **Taufiq Arifin** contributed to research validation, academic review, visualization of research findings, and refinement of the final manuscript. All listed authors have reviewed, critically revised, and approved the final version of this submission.

CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest regarding the publication of this research. The research was conducted independently, and there were no financial, institutional, or personal relationships that could influence the findings and interpretation presented in this article.

ETHICAL COMPLIANCE STATEMENT

This research complied with ethical principles in qualitative research. The identities of participants and organizations were anonymized to maintain confidentiality. Data collection was conducted through voluntary participation, and participants provided informed consent before interviews and observations were conducted.

STATEMENT ON THE USE OF AI OR DIGITAL TOOLS IN WRITING

The authors declare that artificial intelligence (AI)-based tools were not used to generate research data, conduct analysis, or replace academic judgment in the research process. AI tools, if utilized, were only applied as supporting instruments for language improvement, proofreading, and enhancing manuscript readability. The authors remain fully responsible for the accuracy, originality, and integrity of the research content.

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