

# ***The Effectiveness of the Application of Artificial Intelligence-Based Accounting Information Systems at SMEs in Singaraja***

I Putu Julianto<sup>1,\*</sup> Nyoman Suadnyana Pasek<sup>2</sup> I Gd Nandra Hary Wiguna<sup>3</sup>

<sup>1,2,3</sup> *Department of Economic and Accounting, Universitas Pendidikan Ganesha, Singaraja, Indonesia*

\* *Corresponding author. Email: [putujulianto@undiksha.ac.id](mailto:putujulianto@undiksha.ac.id)*

## **ABSTRACT**

This study aims to determine the effectiveness of the application of accounting information systems based on artificial intelligence at SMES in Singaraja. The object of research is the application of SIA based on Artificial Intelligence. The data analysis used in this research is quantitative analysis to determine the percentage of effectiveness of the application of SIA based on Artificial Intelligence. The results showed that the application of a computer-based Accounting Information System with an artificial intelligence approach was effective. So, it can be stated that the Accounting Information System based on artificial intelligence has an important role in SMES activities in Singaraja.

**Keywords:** *Accounting Information Systems, Artificial Intelligence, Effectiveness*

## **1. INTRODUCTION**

An adequate information system in a company can support and assist management in providing information. The ability of company managers to allocate resources efficiently and effectively requires accounting information as an important basis in making resource allocation decisions. Such information is such as the company's financial statements, to produce accounting information an accounting information system is needed. According to [1], an accounting information system is a collection of a set of human-like resources and supported tools designed to transform accounting data into accounting information needed by managers and non-user managers in the decision-making process.

At first the company's information system was done entirely by humans, then in line with technological developments, manual information systems that were done entirely by humans began to be transformed into computer-based systems. Computers are not only able to perform calculations quickly, but are also very accurate and expansive processors. When compared to humans, humans are very slow, and limited. Computers can process hundreds of transactions at a certain time while humans can only process one transaction. This happens because the computer's ability to process data far exceeds human speed. In addition to affecting data processing and storage, computers also have a significant impact on

corporate organization, decision making and the efficient use of accounting functions. Accountants' job in producing financial and non-financial information is relatively easy to do at this time. This is due to the development of information technology, both computers and telecommunications. According to [1], "accounting information systems cover the use of information technology to provide information for users." Computers are used in many types of information systems. Information technology involves computers, but also involves other technologies to respond to information. The existence of computer networks also helps accountants because accounting information systems in large, medium-sized companies use computer networks as an integral part of the accounting information system. Therefore, the computer network the information needs of the users of the accounting information system can be fulfilled more quickly, accurately and with a relatively small risk of error. In addition, computer networks can also relatively reduce the risk of repetitive work. Computers are an important part of information technology to greatly assist the quality of information systems. To manage information effectively into a valuable resource, the development of a modern accounting information system will be better if you use computers. The development of increasingly advanced computer technology, causing more and more companies to use computer services to process their accounting data. Therefore, the information needs of the SIA users can be

fulfilled more quickly, accurately and with a relatively small risk of error. Current technological developments can help companies to record transactions that occur within the company in a controlled manner. Companies that use computer-based information systems to process their accounting data will know the concept of databases. Database can be defined as a collection of data organized to serve various applications by centralizing data. The database component consists of system users. Micro, Small and Medium Enterprises (SMES) are an important sector and have a large contribution to achieve national economic development goals, such as economic growth, job opportunities, increase in foreign exchange, and regional economic development. It is recognized that (SMES) have an important role in economic development and growth, not only in developing countries such as Indonesia, but also in developed countries such as Japan, the United States and European countries [2]. At the time of the monetary crisis in mid-1997, where big businessmen and BUMNs could not survive it, small businesses (and the informal sector) were able to survive the crisis and even thrive. Small businesses and the informal sector have shown their participation in the national economy in various contributions both from the macro and micro sides [3] Referring to the fact that the large contribution of SMES to economic development, efforts should be made to develop SMES which are expected to lead to the welfare of SMES owners in particular and the surrounding community as well as to improve the nation's welfare.

The development of SMES is not merely a step that must be taken by the Government and only becomes the responsibility of the Government. The SMES itself as the party being developed, can also take steps together with the Government. Apart from the Government and SMES, the role of the banking sector is also very important in relation to all matters concerning funding, especially in terms of providing loans or establishing banking policies. Furthermore, related to the availability of funds or capital, the role of investors, both domestic and foreign, cannot be ruled out. Higher Education/Academics can also participate in the development of SMES through the contribution of science and technology that can help SMES manage their business. Accounting plays an important role in the progress of a small business. However, so far there are still many SMES that do not understand the importance of accounting implemented in financial reports, even though this has very large benefits for business development. The industrial structure in Indonesia shows that the number of small, medium-sized companies and cooperatives is actually higher than that of large companies. Artificial Intelligence or Artificial Intelligence is a branch of science that deals with the use of machines to solve complex problems in a more humane way. This is usually done by following/imitating the characteristics and thinking analogies of human

intelligence, and applying them as algorithms known to computers.

With a more or less flexible and efficient approach it can be taken depending on the needs, which influence how artificial intelligence behaves. AI is usually associated with Computer Science, but is also closely related to other fields such as Mathematics, Psychology, Observation, Biology, Philosophy, and others. The ability to combine knowledge from all of these fields will ultimately benefit progress in creating an artificial intelligence. Many things seem difficult for human intelligence, but for informatics it is relatively unproblematic. For example: transforming equations, solving integral equations, making a game of chess or Backgammon. On the other hand, things that seem to humans require a little intelligence, are still difficult to realize in Informatics. For example: Object/Face Introduction, playing soccer. Although AI has strong science fiction connotations, it forms a very important branch of computer science, dealing with intelligent behaviour, learning and adaptation in machines. Research in AI concerns the building of machines to automate tasks that require intelligent behaviour. Examples include control, planning and scheduling, the ability to answer diagnoses and customer inquiries, and handwriting, voice and facial recognition. Such matters have become a separate discipline, which focuses on providing solutions to real-life problems. AI systems are now often used in economics, medicine, engineering and the military, as they have been built into several home computer software applications and video games.

Artificial Intelligence is artificial intelligence with simulations in machines that are programmed to resemble human intelligence processes and mimic their actions, so that the system is now able to think similarly to humans systematically and more quickly, so that output can be generated immediately. These processes include learning (acquiring information and the rules for using information), reasoning (using rules to arrive at a definite estimate of conclusions) and perception. The presence of this technology has started to erase and narrow some of the jobs for all companies.

AI has some advantages and disadvantages. One of the advantages of AI is permanent, does not change (depending on computer systems and programs). AI can store various information or data without any x restrictions (can be adjusted as needed). The use of AI is also considered a more efficient and accurate use of time in doing a job (in the work system). It has the nature of solving complex problems and increase work productivity. Finally, it can duplicate and transfer a capability easily from one computer to another.

Despite the advantages, AI also has some weaknesses. The intelligence that is in Artificial Intelligence depends on what is input by the programmer (limited to a program). It is limited based on input

samples, cannot innovate or create new things. AI does not have the so-called common sense, which is the ability not only to process information but also to understand the information. AI also does not have the ability to develop knowledge, development of knowledge on AI depends on the system being built. As discussed in the previous point, there are times that some of the newest innovations in the field are technology that worries humans too much. This is because it is feared that human existence will become increasingly displaced by the role of machines. Likewise in developments in accounting procedures and financial reports. In every bookkeeping innovation there is still a sense of concern from accountants about their work area which might be more and more displaced by the existence of sophisticated machines.

One of the newest innovations in this matter of bookkeeping is by embedding artificial intelligence (AI) or artificial intelligence in the latest bookkeeping machines. This machine is claimed to be able to eliminate various errors in terms of bookkeeping quite accurately. In addition, machines like this will not take too long when compared to conventional bookkeeping by companies.

Based on data obtained from the Office of Cooperatives and SMEs in Buleleng Regency, it can be seen that the data on the number of SMES in Buleleng Regency in 2020, based on the business classification, are as follows:

- 1) Micro Enterprises = 1,871 (formal), 22,679 (non-formal)
- 2) Small Enterprises = 468 (formal), 7,679 (non-formal)
- 3) Medium Enterprises = 189 (formal), 4 (non-formal)
- 4) Large Enterprises = 17 (formal)

The total number of SMES in Buleleng Regency in 2020 was 32,907 SMES. This shows that the development of SMES in the city of Singaraja has developed very rapidly. With the development of the business, of course, it will increase complexity in transactions. To help with the transaction process, we need a system that will make it easier for SMES players to make transactions. This system is based on artificial intelligence which is implemented in an application. This information system can improve the quality of service at these SMES. Another advantage of this information system is that it is more effective, in this information system there are already automatic reports in the system such as balance reports and realization reports and the calculations are more accurate than the manual system. From the results of the author's interviews with SMES actors, they still have constraints in the limited human resources who have not mastered the data processing system both in the form of calculations and artificial intelligent based transactions which are expected to make data presentation more accurate. The limitations that are

owned will affect the application of accounting information systems based on Artificial Intelligent in terms of data security, time, accuracy, relevance, variety of reports, physical comfort of accountants and quality of information.

The problem that will be discussed in this study is the effectiveness of the application of accounting information systems based on artificial intelligence at SMES in Singaraja. The purpose of this study is to determine the effectiveness of the application of accounting information systems based on artificial intelligence at SMES in Singaraja.

## 2. LITERATURE REVIEW

The information system is a tool for presenting information in such a way that it is useful for the recipient, while the accounting information system is a system that converts business transactions into financial information that is useful for the user. [4] Information systems can be a strategic strength and tool for organizations that provide benefits in terms of promotion and competitiveness [5] The adoption of Information Technology provides the ability for SMES to provide better services and competitiveness. Information technology is also proven to have a positive impact on organizational performance [6].

There are several previous studies related to this research topic, namely:

- 1) Reference [7] who designed an accounting information system for SMES using the RAD (rapid application development) method with the SQL programming language found that the application design was able to provide financial statement information for trading companies consisting of income statements, reports of changes in capital and balance sheet.
- 2) Reference [8] who analyzed and designed a mobile-based accounting information system at CV. The Cilacap Matrix found that the design of an accounting information system was able to make employee performance more efficient and effective because employees did not need to write notes manually. In addition, SIA is able to make it easier for company leaders to monitor the company's financial condition.
- 3) Reference [9] who found that the design of a mobile-based cash sales system made with the Macromedia Dreamweaver program with the PHPMySQL database was able to secure the company's wealth.
- 4) Reference [10] who designed a mobile-based Small and Medium Business Accounting Information System at Erfa Busana Addimyati using a prototyping model and built using the SSAD (Structured Analysis and Design) software

development model found that the system is able to process and display financial data in the form of general journals, general ledger and income statement and balance sheet from input transaction data by the user.

- 5) Reference [11] who designed a mobile-based cash sales accounting system with the SDLC development method found that a mobile-based cash sales system provided old advantages and benefits compared to the old system (manual).
- 6) Reference [12] who evaluating the effectiveness of the Accounting Information System in the hotel industry in the BTDC Nusa Dua Bali area, found that the accounting information system used was effective.

Research on the development of mobile-based SIA for SMES owners is a follow-up to the previous year's research. In 2019, [13] conducted a study on the analysis of the factors that influenced the implementation of SAK ETAP-based financial recording at SMES.

Artificial Intelligence is artificial intelligence with simulations in machines that are programmed to resemble human intelligence processes and mimic their actions, so that the system is now able to think similarly to humans systematically and more quickly, so that output can be generated immediately. These processes include learning (acquiring information and the rules for using information), reasoning (using rules to reach a definite estimate of conclusions) and perception. The presence of this technology has started to erase and narrow some of the jobs for all companies. Here are the advantages and disadvantages of AI:

**Advantages of Artificial Intelligence:**

- 1) Is permanent, does not change (depending on computer systems and programs).
- 2) Can store various information or data without any restrictions (can be adjusted as needed)
- 3) A more efficient and accurate use of time in doing a job (in the work system)
- 4) The ability to solve complex problems and increase work productivity
- 5) Can duplicate and transfer a capability easily from one computer to another

**Weaknesses of Artificial Intelligence:**

- 1) The intelligence that is in Artificial Intelligence depends on what is input by the programmer (limited to a program)
- 2) Limited based on input samples, unable to innovate or not be able to create new things
- 3) Do not have Common Sense, which is the ability not only to process information, but also to understand the information

- 4) Do not have the ability to develop knowledge, development of knowledge on AI depends on the system being built.

### **3. METHOD**

This type of research used in this research is descriptive quantitative research. The subjects in this study were SMEs in Singaraja. The object of research is the application of SIA based on Artificial Intelligence. The data used in this study are based on primary and secondary data. Primary data is the results of interviews obtained from interviewing SMES in Singaraja and the results of respondents' answers obtained using questionnaires. Secondary data is in the form of data on the number of employees obtained from the documentation.

This study uses quantitative data analysis in the form of numbers obtained through a questionnaire about the effectiveness of the application of SIA with an Artificial Intelligence approach and qualitative data obtained in this study is the application of SIA with an Artificial Intelligence approach to SMES in Singaraja. Data collection was carried out by interviewing techniques to obtain data regarding employee responses in the process of implementing SIA based on Artificial Intelligence at SMES in Singaraja. The questionnaire was used to obtain research data in the form of attitudes, values and perceptions of respondents about the effectiveness of the application of SIA with the Artificial Intelligence approach. The questionnaire consists of questions from six predetermined indicators. Data collection with documentation in the form of employees at SMES in Singaraja.

The analysis technique used is quantitative analysis technique, namely the analysis technique which is carried out by performing calculations according to the formula used. According to [14] Likert is used for the purposes of quantitative analysis, then the answer is given a score of 6 (1) very positive answers, has a score of 5 (2) positive answers, a score of 4, (3) neutral answers, a score of 3, (4) negative answers, score 2, (5) the answer is very negative.

Rating Scale is a scale of measurement of raw data obtained in the form of numbers and then interpreted. To determine the percentage of the effectiveness of the application of SIA based on Artificial Intelligence as a data processor, the search for the number of scores obtained for each aspect of the assessment is carried out as follows.

- 1) Determine the highest score and lowest score that may be achieved from the proposed questionnaire. For example: the highest possible score = a lowest possible score = b

- 2) Determine the value range of the score based on the total score of the highest possible score with the lowest possible total score.

The formulation is as follows:

$$\text{Score range} = ab \dots\dots\dots (1)$$

- 3) Determine the value of the value interval based on the comparison between the ranges of value scores with the number of required value criteria. There are five criteria including:

- 1) Very Effective Criteria (KSE)
- 2) Effective Criteria (KE)
- 3) Criteria for Sufficiently Effective (KCE)
- 4) Criteria for Less Effective (KKE)
- 5) Ineffective Criteria (KTE)

Formulation: value interval

$$C = a b \dots\dots\dots (2)$$

$$5$$

[15]

- 4) Determine the range of values for each assessment criterion based on the total score of values obtained by each element with the following formulation.

- 1)  $b + 4c < KSE \leq a \dots\dots\dots (3)$
- 2)  $b + 3c < KE \leq b + 4c \dots\dots\dots (4)$
- 3)  $b + 2c < KCE \leq b + 3c \dots\dots\dots (5)$
- 4)  $b + c < KKE \leq b + 2c \dots\dots\dots (6)$
- 5)  $b \leq KTE \leq b + c \dots\dots\dots (7)$

- 5) Determine the percentage of all questions contained in the questionnaire and determine the effectiveness of SIA based on Artificial Intelligence as a data processor by dividing the total score obtained by the number of ideal scores after which it is multiplied by 100% [15]). The effectiveness of the application of Artificial Intelligence-based SIA if assessed from indicators of data independence, data integration, and time with the following calculations:

1) Calculation of sub indicators

a)  $a = 5 \times 5 = 25$

$$b = 1 \times 5 = 5$$

b) Range of scores = a-b

$$= 25 - 5$$

$$= 20$$

c) Interval:  $c = ab/5$

$$= 255/5$$

$$= 4$$

Based on the calculations that have been described, the value ranges for the sub indicators of data independence, data integration, and time can be determined using the following formulation.

- a. Criteria for Very Effective (KSE) =  $21 < KSE \leq 25$
- b. Effective Criteria (KE) =  $17 < KE \leq 21$
- c. Criteria Sufficiently Effective (KCE) =  $13 < KCE \leq 17$
- d. Criteria for Less Effective (KKE) =  $9 < KKE \leq 13$
- e. Criteria for Ineffective (KTE) =  $5 \leq KTE \leq 9$

2) Calculation of indicators

a)  $a = 5 \times 5 \times 15 = 375$

$$b = 1 \times 5 \times 15 = 75$$

b) Range score = a-b

$$= 375 - 75$$

$$= 300$$

c) Interval:  $c = ab/5$

$$= 375 - 75 / 5$$

$$= 60$$

Based on the calculations described above, the value ranges for indicators of data independence, data integration, and time can be determined using the following formulations.

- a. Very Effective Criteria (KSE) =  $315 < KSE \leq 375$
- b. Effective Criteria (KE) =  $255 < KE \leq 315$
- c. Sufficiently Effective Criteria (KCE) =  $195 < KCE \leq 255$
- d. Less Effective Criteria (KKE) =  $135 < KKE \leq 195$
- e. Ineffective Criteria (KTE) =  $75 \leq KTE \leq 135$

The effectiveness of the application of computer-based SIA with the Artificial Intelligence approach when assessed from indicators of data standardization, data security and variations of reports with the following calculations.

1) Calculation of sub-indicators

a)  $a = 5 \times 4 = 20$

$$b = 1 \times 4 = 4$$

b) Range score = a-b

$$= 20 - 4$$

$$= 16$$

c) Interval:  $c = a-b/5$

$$= 20 - 4 / 5$$

$$= 3,2$$

Based on the calculations that have been described, the value ranges for sub indicators of data standardization, data security and report variations can be determined with the following formulation.

- a. Criteria for Very Effective (KSE) =  $16.8 < KSE \leq 20$
- b. Effective Criteria (KE) =  $13.6 < KE \leq 16.8$
- c. Criteria for Moderately Effective (KCE) =  $10.4 < KCE \leq 13.6$
- d. Criteria for Less Effective (KKE) =  $7.2 < KKE \leq 10.4$
- e. Criteria for Ineffective (KTE) =  $4 \leq KTE \leq 7,2$

2) Calculation of indicators

a)  $a = 5 \times 4 \times 15 = 300$

b)  $b = 1 \times 4 \times 15 = 60$

b) Range score =  $a - b$

=  $300 - 60$

= 240

c) Interval:  $c = 300 - 60 / 5$

= 48

Based on the calculations that have been described, the value ranges for indicators of data standardization, data security and report variations can be determined by the following formulation.

- a. Criteria for Very Effective (KSE) =  $264 < KSE \leq 300$
- b. Effective Criteria (KE) =  $216 < KE \leq 264$
- c. Criteria Sufficiently Effective (KCE) =  $156 < KCE \leq 216$
- d. Criteria for Less Effective (KKE) =  $108 < KKE \leq 156$
- e. Criteria for Ineffective (KTE) =  $60 \leq KTE \leq 108$

The calculation of the overall indicator, which is to calculate all the indicators that have been determined in the research on the effectiveness of the application of SIA based on Artificial Intelligence to SMES in Singaraja, is as follows.

1 = data independence indicator

2 = data standardization indicator

3 = data integration indicator

4 = time indicator

5 = data safety indicator

6 = report variation indicator

The effectiveness of the application of SIA based on Artificial Intelligence if assessed in total, with the following calculations

1)  $a = 5 \times 27 \times 15 = 2,025$   $b = 1 \times 27 \times 15 = 405$

2) Range Score =  $a - b$

=  $2,025 - 405$

= 1,620

3) Interval:  $c = ab / 5$

=  $2.025 - 405 / 5 = 324$

Based on the calculations that have been described, the value range for each of the assessment criteria can be determined by the following formulation.

- a. Very Effective Criteria (KSE) =  $1.701 < KSE \leq 2.025$
- b. Effective Criteria (KE) =  $1.377 < KE \leq 1,701$
- c. Sufficiently Effective Criteria (KCE) =  $1,053 < KCE \leq 1,377$
- d. Less Effective Criteria (KKE) =  $729 < KKE \leq 1.053$
- e. Criteria for Ineffective (KTE) =  $405 \leq KTE \leq 729(2)$

#### 4. RESULT AND DISCUSSION

The application of a computer-based accounting information system with an artificial intelligence approach to SMES in Singaraja consists of three processes: (1) data input is done by entering transaction data that occurred on the date of the incident into the database. In SMES in Singaraja, data input is carried out carefully so as to reduce the occurrence of data entry errors. Data input at SMES in Singaraja pays attention to timeliness, integration and uniformity in the use of account names and the determination of savings and loan interest. (2) Data processing in artificial intelligence is related to uniformity and integration. This becomes important when the entire data processing system develops according to a predetermined plan. This data processing is done automatically in artificial intelligence. (3) The output or output from processing data on SMES transactions in Singaraja is in the form of financial reports. The resulting financial reports such as cash flow statements, balance sheets and differences in operating results (SHU). This financial report is processed automatically by the system used by SMES in Singaraja and can be printed at any time by information users for decision making.

The effectiveness of the application of computer-based accounting information systems with an artificial intelligence approach to SMES in Singaraja, is included in the effective criteria. This can be seen from the acquisition of each indicator, which is based on the data independence indicator with a total score of 1,689, including the effective criteria, can be seen in Table 1.

The conclusion from Table 1 and Table 2 that from the application of computer-based SIA with the Artificial Intelligence approach to SMES in Singaraja City from the data independence indicator with a total score of 290

when compared with the effectiveness criteria, it includes effective criteria and data standardization indicators with the results of the effectiveness analysis including criteria effective with a score of 257.

**Table 1.** Data Independence Indicator

No Respondent	Score	Frequency	Score Range	Criteria
1	22			
2	23			
3	23	5	$21 < SKE \leq 25$	Highly Effective
4	24			
5	22			
6	20			
7	19			
8	20	5	$17 < KE \leq 21$	Effective
9	19			
10	21			
11	17			
12	16	4	$13 < KCE \leq 17$	Quite Effective
13	17			
14	17			
15	10	1	$9 < KE \leq 13$	Less Effective
Total Score Indicator	290		$255 < KSE \leq 315$	Effective

**Table 2.** Data Independence Indicator

No Respondent	Score	Frequency	Score Range	Criteria
1	18			
2	17			
3	17			
4	19			
5	18			
6	20	11	$16,8 < SKE \leq 20$	Highly Effective
7	19			
8	20			
9	19			
10	17			
11	17			
12	15	2	$13,6 < KE \leq 16,8$	Effective
13	15			
14	13			
15	13	2	$10,4 < KE \leq 13,6$	Quite Effective
Total Score Indicator	257		$216 < KSE \leq 264$	Effective

The conclusion from Table 3 and Table 4 is that from the application of computer-based SIA with the Artificial Intelligence approach to SMES in Singaraja City from the data integration indicator with a total score of 299 when compared with the effectiveness criteria, it includes effective criteria and time indicators with the results of

the effectiveness analysis including the effective criteria with a score of 313.

**Table 3.** Data Independence Indicator

No Respondent	Score	Frequency	Score Range	Criteria
1	22			
2	23			
3	23	6	$21 < SKE \leq 25$	Highly Effective
4	24			
5	24			
6	22			
7	20			
8	20	4	$17 < KE \leq 21$	Effective
9	21			
10	21			
11	17			
12	16	4	$13 < KCE \leq 17$	Quite Effective
13	16			
14	17			
15	13	1	$9 < KE \leq 13$	Less Effective
Total Score Indicator	299		$255 < KSE \leq 315$	Effective

**Table 4.** Time Indicators

No Respondent	Score	Frequency	Score Range	Criteria
1	22			
2	23			
3	23	7	$21 < SKE \leq 25$	Highly Effective
4	23			
5	24			
6	22			
7	20			
8	20	7	$17 < KE \leq 21$	Effective
9	21			
10	21			
11	19			
12	20			
13	18			
14	20			
15	17	1	$13 < KCE \leq 17$	Quite Effective
Total Score Indicator	313		$255 < KSE \leq 315$	Effective

The conclusion from Table 5 and Table 6 is that from the application of computer-based SIA with an artificial intelligence approach to SMES in Singaraja City from data security indicators with a total score of 258 when compared with the effectiveness criteria, it includes

effective criteria and indicators of variations in reports with the results of effectiveness analysis including very criteria effective with a score of 270.

**Table 5.** Data Security Indicator

No Respondent	Score	Frequency	Score Range	Criteria
1	18			
2	17			
3	17			
4	19			
5	18			
6	20	10	$16,8 < SKE \leq 20$	Highly Effective
7	19			
8	20			
9	19			
10	19			
11	16			
12	15	3	$13,6 < KE \leq 16,8$	Effective
13	15			
14	13			
15	13	2	$10,4 < KE \leq 13,6$	Quite Effective
Total Score Indicator	258		$216 < KSE \leq 264$	Effective

**Table 6.** Indicators of Report Variation

No Respondent	Score	Frequency	Score Range	Criteria
1	18			
2	17			
3	17			
4	19			
5	18			
6	19	13	$16,8 < SKE \leq 20$	Highly Effective
7	19			
8	19			
9	19			
10	19			
11	16			
12	19			
13	19			
14	16	2	$13,6 < KE \leq 16,8$	Effective
15	16			
Total Score Indicator	270		$264 < KSE \leq 300$	Highly Effective

**Table 7.** Effectiveness of computer-based SIA with the Artificial Intelligence approach.

Info	Score Indicator	Score Range	Criteria
Independency Data	290	255 < KE ≤ 315	Effective
Standardized data	257	216 < KE ≤ 264	Effective
Data Integration	299	255 < KE ≤ 315	Effective
Timely	313	255 < KE ≤ 315	Effective
Data Security	258	216 < KE ≤ 264	Effective
Variant of Report	270	264 < KE ≤ 300	Highly Effective
TOTAL SCORE	1687	1.377 < KE ≤ 1.701	Effective

Based on the research results, the application of computer-based SIA with an artificial intelligence approach has an important role in SMES activities in Singaraja. This role is like the ease in data input that can be done only on one computer because the system is effectively integrated, besides that, transaction data processing that occurs every day can be processed automatically so as to produce financial reports (output) needed by information users. This can be seen from the results of data analysis obtained through six indicators, namely data independence, data standardization, data integration, timing, data security, and report variations. This finding is in accordance with the opinion of [16] which states that in order to manage information effectively into a valuable resource, the development of a modern accounting information system will be better if it uses information technology and computer networks.

SMESs in Singaraja implement computer-based SIA with an artificial intelligence approach that has effective data independence criteria. This can be seen from the results of the effectiveness analysis on the indicators of data independence. These findings prove that a computer-based SIA with an artificial intelligence approach on data independence indicators can make it easier to run the system. In accordance with the explanation of [17], which states that data independence allows changes to be made easier and faster. The results of the effectiveness analysis on data standardization indicators including the Effective Criteria. This shows that the standardization of data on this system is like using the names of accounts. In addition, data standardization can also be seen from the provisions of cooperatives such as setting interest on savings and loans within a certain period. This makes it easier for SMES in Singaraja to process their transaction data. This finding is also consistent with the explanation by [17] regarding standardization which can also be called data consistency. For example, a data element that reflects sales amounts has only one name, one meaning and one format. So it must be compatible with every program that accesses the database. Data integration indicators, the results of the effectiveness analysis are stated including

the Effective Criteria. Data integration in computer-based SIA with an artificial intelligence approach to SMES in Singaraja one centralized data repository can be used by multiple employees. Data that is input on one computer can be read in another computer. This is what makes it easy to process transactions at SMES in Singaraja. This finding is also in line with [17] which states that the artificial intelligence approach provides centralized data storage for use by various users and application programs.

Based on the results of the study, effectiveness at time indicators is an Effective Criteria. The results of this analysis indicate that the speed of computer-based SIA with an artificial intelligence approach in input, processing and presentation of transactions has exceeded manual programs such as Microsoft Excel. In addition, the results of the effectiveness analysis on the fifth indicator, namely data security, are included in the Effective Criteria. The security of data that is stored is guaranteed because there is a password system for each employee with an interest, in addition to that there is a warning menu or an early warning if someone presses the key on the keyboard. This finding is supported by [18] which states that artificial intelligence provides a controlled environment to help users access the database. During processing, Artificial Intelligence periodically creates backup files for the physical database. If there is damage (storage failure, program error or criminal action) that causes the database to be unusable, artificial intelligence can be recovered to a previous version which is considered correct. The results of the effectiveness of the variation indicators report including the Very Effective Criteria. Variations of reports generated by computer-based SIA with an artificial intelligence approach to SMES in Singaraja such as cash flow reports, balance sheets and differences in operating results (SHU). In addition, the system is also able to generate monthly reports automatically and can be requested at any time. The assumption of researchers regarding the findings of this study is that through the application of computer-based SIA with an artificial intelligence

approach, it can smoothen the activities of SMES in Singaraja in terms of input, process and presenting financial reports. Based on the results of the research of the six indicators, the effectiveness of the application of computer-based SIA with the artificial intelligence approach, including the Effective Criteria. This finding is consistent with the findings of [19] Faculty of Economics, Brawijaya University examines the Analysis of the Effectiveness of the Employee Payroll Accounting Information System, it is found that the payroll accounting information system that has been implemented has been effective. This can be seen from the functions, organizational structure, and documentation in accordance with the theory that has been obtained during the lecture. Based on the research results, it can be seen that the application of computer-based SIA with an artificial intelligence approach to SMES in Singaraja provides convenience in processing accounting data automatically as well as integration in networks such as local area networks that facilitate input, process and presentation of financial statements.

## 5. CONCLUSION

Based on the analysis carried out, it can be concluded that the application of computer-based SIA with the artificial intelligence approach has an important role in the activities of SMES in Singaraja. This role is like the ease in data input that can be done only on one computer because the system is effectively integrated, besides that, transaction data processing that occurs every day can be processed automatically so as to produce financial reports (output) needed by information users. This can be seen from the results of data analysis obtained through six indicators, namely data independence, data standardization, data integration, timing, data security, and variations of reports that show effective criteria.

## REFERENCES

- [1] G. Bodnar, H. Hoopwood, and S. William, *Accounting Information Systems*. USA: Pearson Education Limited, 2014.
- [2] Mulyanisman, "Analisa Penerapan Akuntansi Keuangan Pada Perusahaan Menengah Bidang Perdagangan," 2012.
- [3] S. Winarni, "Menerapkan Penggunaan Laporan laba/rugi Pada Usaha Kecil dan Menengah.," *J. Ilm. Akuntansi.*, vol. vol.1 (2), 2019.
- [4] Kusriani and K. Andri, *Tuntunan Praktis Membangun Sistem Informasi Akuntansi dengan Visual Basic & Microsoft SQL Server*. Yogyakarta: Andi, 2007.
- [5] N. Berisha, "The Role of Information Technology in Small and Medium sized Enterprises in Kosovo," *Fullbright Acad. Conf. Small Places Can Chang. World*, 2009.
- [6] I. Apulu and A. Latham, "Drivers for Information and Communication Technology Adoption: A Case Study of Nigerian Small and Medium Sized Enterprises," *Int. J. Bus. Manag.*, 2011.
- [7] Setiawan, "Menerapkan Penggunaan Laporan laba/rugi Pada Usaha Kecil dan Menengah," *J. Ilm. Akunt.*, vol. 1 (2), pp. 72–92, 2008.
- [8] T. Sutrasno, "Analisis dan Perancangan Sistem Informasi Akuntansi Berbasis Web pada CV. Metrix Cilacap," 2012.
- [9] Y. Wiharjanto, "Perancangan Sistem Penjualan Tunai Berbasis Web Sebagai Sarana Informasi Produk Bagi Konsumen," *J. Nominal*, 2012.
- [10] Mujiono, "Perancangan dan Pembuatan Sistem Informasi Akuntansi Usaha Kecil Menengah Pada Erfa Busana Addimyati Brbasis Web," *Univ. Jember Repos.*, 2014.
- [11] T. Indarto, "Perancangan Sistem Akuntansi Penjualan Tunai Berbasis Web pada Perusahaan Kerajinan Karya Mandiri.," *Univ. Negeri Yogyakarta.*, 2010.
- [12] A. Wiratama and Ayu Eka Damayanthi, "PENILAIAN EFEKTIVITAS SISTEM INFORMASI AKUNTANSI PADA INDUSTRI HOTEL DI KAWASAN BTDC NUSA DUA BALI," *E-Jurnal Akunt. Univ. Udayana*, vol. 9(1), pp. 237–244, 2014.
- [13] N. K. Sinarwati, E. Sujana, and N. T. Herawati, "Peran Sistem Informasi Akuntansi Berbasis Mobile bagi Peningkatan Kinerja UMKM," in *WNCE (Warmadewa Natioanl Economic Conference)*, 2019.
- [14] Sugiyono, *Metode Penelitian Kuantitatif, Kualitatif dan R & D*. Bandung: Alfabeta, 2012.
- [15] Sukardi, *Metodologi Penelitian Pendidikan*. Jakarta: PT Bumi Aksara, 2013.
- [16] M. F. Husein, *Sistem Informasi Akuntansi*. Yogyakarta: Akademi Manajemen Perusahaan YKPN, 2004.
- [17] B. Wilkinson, "Small, Micro, and Medium Enterprise Development: Expanding the Option for Debt and Equity Finance.," *Financ. Sect. Work. Natl. Econ. Deve-lopment Labour Counc. Johannesbg.*, 2002.
- [18] J. A. Hall, *Sistem Informasi Akuntansi*. Jakarta: Salemba Empat, 2002.
- [19] A. Primatika, "Analisis Efektivitas Sistem Informasi Akuntansi Penggajian Karyawan," Universitas Brawijaya, 2009.