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RESEARCH ARTICLE

AIMQ METHODOLOGY FOR ACCOUNTING INFORMATION SYSTEM TECHNOLOGY ASSESSMENT

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ABSTRACT

Information Quality is the main factor in assessing the success of an information system. Poor information may lead companies to make wrong decisions while good information could help companies to assess the company's condition, understand what the company needs, help company to set appropriate target and help decision maker to make right decisions. This study aims to assess the quality of information from new accounting information system technology used by one of the 4 star hotel chain in Bali using AIMQ methodology. AIMQ methodology is a method to assess the quality of information and consists of three components: PSP / IQ model, Questioner and Gap analysis. AIMQ evaluate IQ from four dimensions: sound, dependable, useful, and usable information. Through this research, the company will be able to identify which quality dimensions requires improvement and assess the overall performance of the quality of information generated by the new AIS.

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INTRODUCTION

As the company grows, the required information becomes more complex. A small store may only requires accounting records with a few simple transactions done manually (Cash inflow-cash outflow). However, as the store develops into a large company, the complexity of accounting transaction data is difficult to be done manually again. Humans have many limitations such as fatigue, lack of concentration and lack of precision which can affect the accuracy of accounting records. Hence, growing companies need to implement computer technology to facilitate accounting records keeping. The need for accurate and fast Accounting Information demands a good Accounting Information System within a company. Accounting Information System (AIS) is a collection of resources, such as human and equipment, which is set to transform data into information through the Accounting Information System, which is then communicated to the parties who act as decision makers in an organization (Romney & Steinbart, 2018). An objective and good information will help the decision maker to perform the company's SWOT (Strength, weakness, Opportunity and Threat) analysis appropriately (utilizing all available strengths and opportunities, reducing the weaknesses and neutralizing the strategic constraints faced). A good AIS is crucial for a company in running its business operations.

The AIS should be tailored to the company's circumstances. The existence of such systems can assist the tasks of related organizational units. Good AIS can be done manually, can also use technology in accordance with the size and needs of the company (Hall, 2011). As a consequence of human limitations and growing companies, nowadays AIS almost exclusively refers to the use of computer technology and software to generate accounting reports. This study examines the problems encountered by one of Four Stars hotel in Bali. The hotel now has been using computerized AIS for more than ten years. Two years ago, the hotel management decided to change its accounting information system and started using new software. However, currently, the company management feels the need to assess the quality of information generated by the new system, as changing of system incurs high cost. This study aims to assess the quality of information technology from AIS used by this hotel and will refer to methodology that was created by Lee, *et al*. The method used is an AIMQ that is modified to fit the needs of the Hotel. AIMQ method provides a rigorous and pragmatic basis for IQ assessments and benchmarks (Lee, Et, al., 2000).

Literature review: Research on data quality started abroad in the 1990s, and many scholars proposed different definitions of data quality and division methods of quality dimensions (Cai and Zhu, 2015).

Referring to Hall (2011), data is not necessarily useful but data that is processed can produce information that is useful and meaningful for decision makers. Hence, this research focuses on information quality rather than data quality. Information Quality (IQ) is a multidisciplinary area. As a profit-oriented company, of course, information relating to financial records (accounting) becomes the core of company information, without ruling out other types of information. Table 1 listed previous research works on IQ and dimensions used. In Table 1, it can be seen that Miller's (1996) study used 10 dimensions which only consider consumer's side of information. Meanwhile, Lee, *et al*.'s (2002) research used 15 dimensions that measure information quality from various parties, i.e. 52 respondents were employed, comprising of information collectors, information consumers, and IS professionals in six companies, to obtain 15 dimensions of AIMQ. Alla and Faryadi (2013) used only four dimensions which may not be sufficient to cover a hotel's needs. While, Cai and Zhu (2015) produced four IQ dimensions consisting of 14 elements, including several elements proposed by Cai and Zhu (2015). However, Cai and Zhu's work contain metadata elements which can not be applied to the assessment of the hotel IQ and does not cover security elements which are crucial in IQ. Batini and Sanncapieco (2016) provide eight-dimensional IQ, which is still less complete than Lee *et al*. (2002) and Cai and Zhu (2015).

The main reference of this study is AIMQ Quality Dimension (Lee, *et.al.,* 2002) plus one additional dimension of auditability from Cai and Zhu research (2015). AIMQ (Aim Quality) is chosen because it provides complete dimensions and has been through various statistical tests. Although AIMQ's has emerged from 2002, but compared to recent research, the dimensions proposed by AIMQ are still more complete and can cover the needs of hotel management. In addition to the dimensions proposed by AIMQ, based on discussions with the hotel management, this research added auditability as in the accounting information system all information generated must be audited/verified.

AIMQ includes three main components, with each component has its own advantages and therefore contributes itself: (Lee, *et al*., 2002)

- The PSP/IQ model (Product and Service Performance model for Information Quality) set 15 dimensions in 4 quadrants. This model assesses IQ in terms of conformity with specification (1), meets or even exceeds consumer expectations (2) on a single axis. On the other axis assesses IQ as product (3) and service (4). It is a management tool for assessing IQ in business concepts.
- The IQA (Information Quality Assesment) instrument is a questionnaire set provided by AIMQ, used to measure each IQ dimension.
- Gap Analysis, with gap analysis, organizations may understand their IQ shortcomings compared to other organizations or across different stakeholders in one organization. Using these analytical techniques, organizations will be able to measure their IQs and determine the appropriate areas for focusing remedial efforts.

This methodology is useful in identifying IQ issues, prioritizing areas for IQ improvement, and monitoring IQ increments over time.

MATERIALS AND METHODS

The method used in this study refers to AIMQ (Lee, et.al. 2002) with some modifications. The steps to analyze information AIMQ method are described as follows:

- Select the dimensions used in this study and place them in four quadrants: Sound Information, Useful Information, Dependable Information and Usable Information (PSP / IQ Model). The hotel management has agreed to use the dimensions proposed by AIMQ, but interviews and further discussion will be conducted later to add dimensions to better fit the needs of the hotel.
- IQA Instruments: Create and distribute questionnaires that measure all dimensions to all IS role: Users (information collectors, information consumers) and IS professionals of the company. This study used questionnaire from AIMQ. In the method proposed by AIMQ, questionnaires were distributed to 5 companies. But, in this study, the questionnaires were spread within one company only. The questionnaires in this study were given to 30 people from middle-top management companies (information collector and information consumer) as users.. For gap analysis, questionnaires were given to the company's IS professionals (6 people). The questionnaire was measured using a semantic scale of 0-5. Assessment criteria can be seen in Table 2.
- Performing gap analysis. In AIMQ method (Lee *et al*, 2002), Gap Analysis is done in two ways. The first way is to compare the company management questionnaire result with The First Rank Company (benchmarking Gap analysis). The second is to compare the company management questionnaire result with the results of the IS professional questionnaire (Role Gap Analysis). In this research, benchmarking Gap analysis was not conducted because the questionnaires were not distributed to competitor/leader hotels. Role gap analysis was performed instead, to compare the company management assessment (Users) with IS professional company assessment.
- Identify IQ problems and lay the foundation for IQ improvement

DİSCUSSİON

Based on interviews with the Head of Purchasing, Head of Finance and Head of Accounting, this study uses 15 dimensions of IQ from AIMQ with one additional dimension: auditability (Cai and Zhu, 2015) to cover the assessment of Financial Reports produced by AIS. Auditability is included in the Usable Information quadrant. Figure 1 shows four quadrants consisting of 16 dimensions (15 dimensions from AIMQ plus auditability dimension): sound information (Free-of-error, Concise representation, Completeness, Consistent representation), useful information (Appropriate amount, Relevancy, Understandability, Interpretability, Objectivity), and usable information (Believability, Accessibility, Ease of operation, Reputation, Auditability).

To measure Auditability, two more questions were added in the questionnaire

- Information can be traced to the manufacturing process
- Software used to generate tax calculations with the resulted amount corresponding to the company report to the government.

Table 1. Previous Research Works on IQ and Dimensions Used

	Previous Researcher	IQ Dimensions
1	Miller (1996)	10 IQ Dimensions (Relevance, Accuracy, Timeliness, Completeness, Coherence, Format, Accessibility, Compatibility, Security, Validity)
2	Lee, *et al*. (2002)	4 four quadrant (15 dimensions): sound information (Free-of-error, Concise representation, Completeness, Consistent representation), dependable information (Timeliness, Security), useful information (Appropriate amount, Relevancy, Understandability, Interpretability, Objectivity), and usable information (Believability, Accessibility, Ease of operation, Reputation).
3	Alla and Faryadi (2013)	4 IQ Dimensions (Accuracy, Relevancy, Accessibility, Validity)
4	Cai and Zhu (2015)	4 Information Quality Dimensions (Availability, Usability, Reliability, Relevance, Presentation Quality) consist of 14 elements (Accessibility, Timeliness, Authorization, Definition/ Documentation, Credibility, MetaData, Accuracy, Integrity, Consistency, Completeness, Auditability, Fitness, Readability, Structure)
5	Batini and Scannapieco (2016)	8 Information Quality Dimensions (Accuracy, Completeness, Redundancy, Readibility, Accessibility, Consistency, Usefulness, Trust)

Table 2. Assessment Criteria

Mean	Category
0-1	Very Poor
1-2	Poor
2-3	Acceptable
3-4	Good
4-5	Very Good

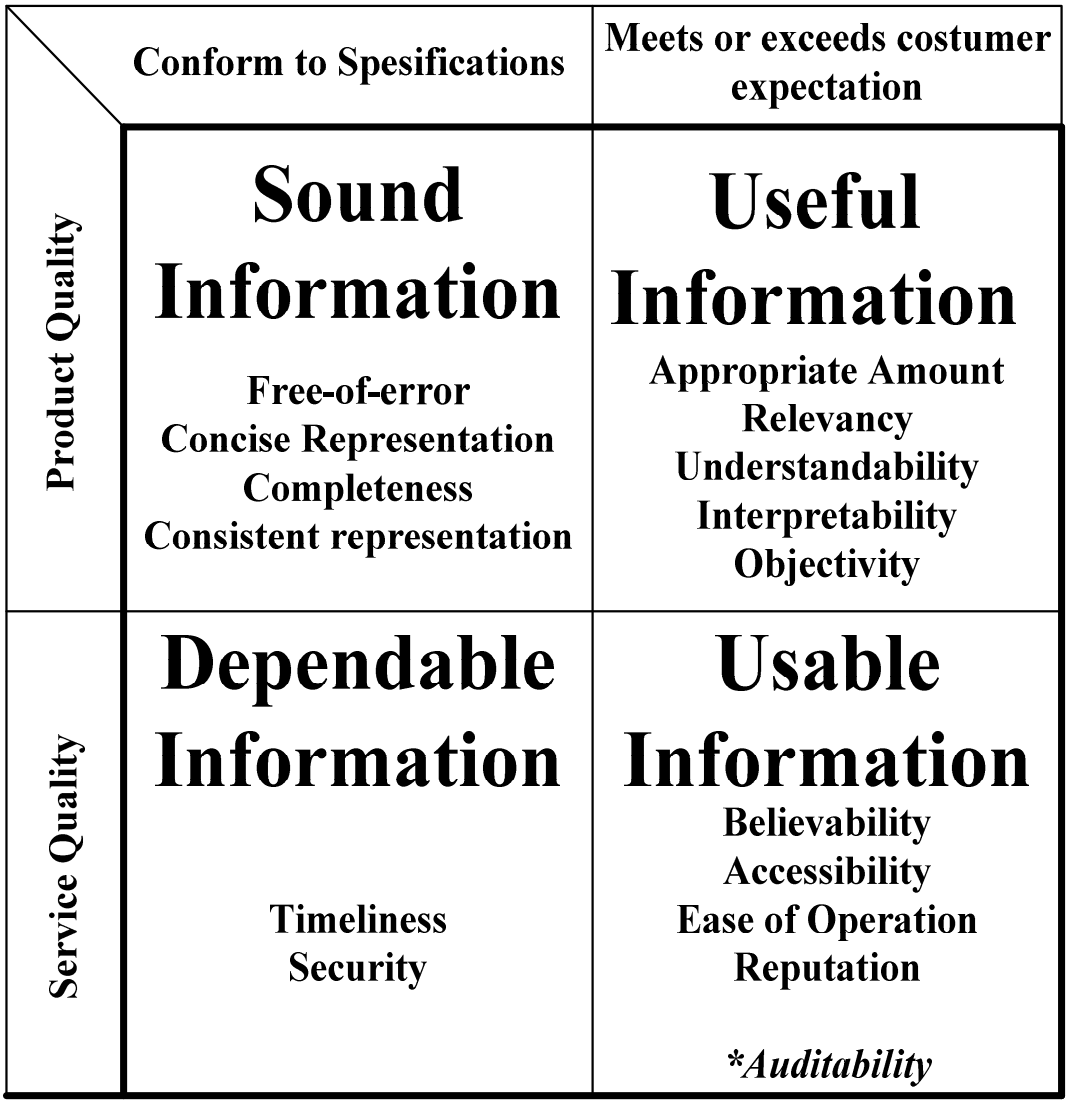

Figure 1. AIMQ Quadrants

	Conform to Spesifications	Meets or exceeds costumer expectation
Product Quality	**Sound Information** DIMENSION / MEAN Free of Error 3.72 Concise Representation 3.5 Completeness 3.52 Consistent Representation 3.54 MEAN QUADRAN 3.57	**Useful Information** DIMENSION / MEAN Appropriate Amount 3.14 Relevancy 3.14 Understandability 2.91 Interpretability 2.87 Objectivity 3.2 MEAN QUADRAN 3.05
Service Quality	**Dependable Information** DIMENSION / MEAN Timeliness 4.09 Security 4.03 MEAN QUADRAN 4.06	**Usable Information** DIMENSION / MEAN Believability 4.34 Accessibility 4.24 Ease of Operation 4.11 Reputation 4.17 Auditability 3.24 MEAN QUADRAN 4.02

Figure 2. AIMQ Questionnaire Result

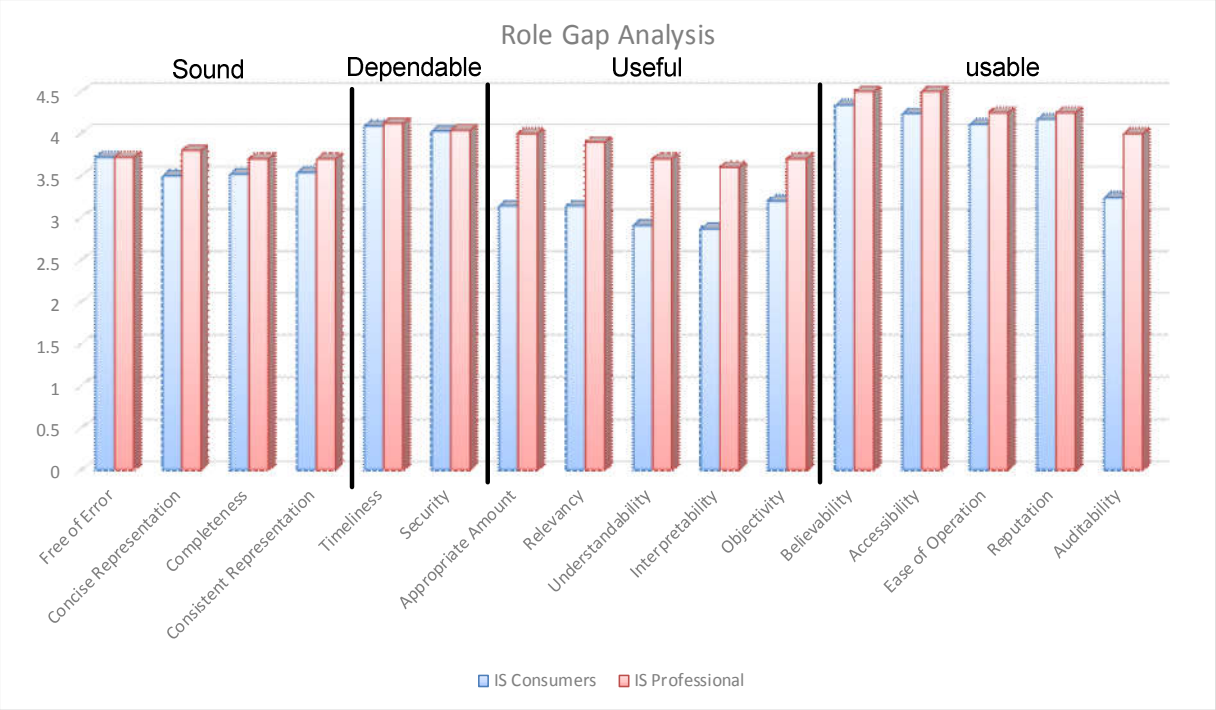

Figure 3. Role Gap Analysis

Questionnaires were distributed to 36 respondents consisting of 30 Users (20 information collectors and 10 information consumers) and 6 IS professionals. Figure 2 shows the results of questionnaires given to the internal company i.e. 30 software users (information collectors and information consumer). Sound Information Quadrant is a quadrant that contains Product Quality and Conform to Specification. The dimensions that exist in this quadrant are dimensions that have physically met the product specification (quality provided by the IS provider) which are Free of Error, Concise

Representation, Completeness and Consistent Representation:

- Free of Error dimension obtains a mean value of 3.72, which is categorized as Good and is nearing Very Good. This value indicates that according to the Information Consumers, SIA used has produced information that is sufficiently correct, accurate and reliable.
- Concise Representation dimension obtains a mean value of 3.5, which is categorized as Good. This value indicates the information generated by the SIA for company usage is sufficiently compact in format and fairly concise. The resulting information is pretty simple but meaningful.
- The dimension of Completeness derives a mean of 3.52 which is categorized as Good. This indicates that the information generated by SIA is sufficiently complete for the information consumer's needs and tasks
- Consistent Representation obtains a mean value of 3.54 which is categorized as Good. This indicates that according to the Information Consumers, SIA produces enough information which are presented consistently and relatively easy to aggregate.

Sound Information Quadrant has a mean of 3.57, which is categorized as Good but still has significant gap to Very Good value of 4 indicating room for improvement. Dependable Information Quadrant includes Service Quality and Conform to Specification. The dimensions in this quadrant are the intangible quality that meets product specifications (quality provided by the IS provider).

This quadrant has two dimensions: Timeliness and Security:

- Timeliness Dimension obtains a mean value of 4.09, which is categorized as Very Good. This shows that information generated by the SIA is sufficiently current, up-to-date and timely.
- Security Dimension obtains a mean value of 4.03, which is categorized as Very Good. This indicates that information generated by the company SIA is very sufficiently protected against unauthorized access from outside. Information can be accessed by authorized people by password.

The Dependable Information Quadrant has a mean of 4.06 which falls under Very Good category. This quadrant is rated high by Users and hence should be marked for improvement although not considered a top priority.

Useful Information Quadrant covers Product Quality and Meet Consumers' Expectation. The dimensions in this quadrant are those which physical quality/ display / output have met consumers satisfaction. This quadrant has five dimensions: Appropriate Amount, Relevancy, Understandability, Interpretability, and Objectivity.

- Appropriate Amount Dimension obtains a mean value of 3.14, which falls under Good category but approaches the Acceptable value. This shows that according to User assessment, the amount of information generated by SIA is not sufficient in volume and does not really match the consumers' needs.
- Relevancy Dimension obtains a mean value of 3.14, which falls under Good criterion but approaches the Acceptable value. This indicates that according to IC assessment, the information generated by SIA is not really useful, relevant, appropriate or applicable to the consumer's work.
- Understandability Dimension obtains a mean value of 2.91, which falls under Acceptable category. This indicates that according to IC assessment, information generated by AIS is difficult to understand or comprehend.
- Interpretability Dimensions obtains a mean value of 2.87, which falls under Acceptable category. This shows that according to IC assessment, information generated by SIA is not easy to interpret.
- Objectivity Dimension obtains a mean value of 3.20 which falls under Good category but near to Acceptable category. This indicates that according to IC assessment, the information generated by SIA is sufficiently objective and based on facts.
- Useful Information Quadrant has an average of 3.05 which falls under Good category but very near to Poor category (<3). This shows that the Useful Information Quadrant needs to be given priority for improvement.

Usable Information Quadrant covers Service Quality and Meet Consumers Expectation. The dimensions in this quadrant are intangible quality that fulfills consumers' expectation. This quadrant contains five dimensions: Believability, Accessibility, Ease of Operation, Reputation, and Auditability.

- Believability dimension has a mean value of 4.34, which falls under Good category. This shows that information generated by the system are believable, trustworthy and credible
- Accessibility dimension obtains a mean value of 4.24, which falls under Very Good category. This indicates that information generated by the system is quickly accessible when needed with simple process.
- Ease of Operation dimension obtains a mean value of 4.11, which falls under Very Good category. This indicates that information generated by the system is easy to aggregate and combine with other information.
- Reputation dimension obtains a mean value of 4.17, which falls under Very Good category. This shows that this information generated by the system has good reputation for quality.
- Auditability dimension has a mean value of 3.24, which falls under Good category. From all dimensions included in Usable Information Quadrant, Auditability dimension gets the lowest value, after interview, we know that information generated by the system is difficult to be verified and tax accounting produced by

the software may not be equal to the tax amount reported to government.

Usable Information Quadrant has an average of 4.02, which is considered as Very Good. However, audibility, which is one of the dimensions in the Usable Information quadrant, scores fairly low. The reason is because the software cannot calculate the tax based on Indonesian tax law. From the four quadrants above, the highest rated quadrant is Dependable Information Quadrant followed by Usable Information Quadrant and Sound Information Quadrant, while Useful Information quadrant obtains the lowest value. Consequently, Useful Information Quadrant must be given top priority for improvement. The primary problem detected from Useful Information Quadrant is the dissatisfaction regarding the display output of the new AIS System. The complicated layout and navigation structures (overloading, confusing, diverting) resulting in difficulty to understand the output of the new system. Besides, the language used in the output is also confusing. Furthermore, the amount of information from Managerial Accounting Report does not exactly match to Management needs. Hence, the process to interpret the information is slow and difficult. Specifically for Financial Reports, the resulting report differs much from the standardized report by the Indonesian Institute of Accountants. Consequently, information users consider the information generated by the new AIS as not too useful.

The next step is to perform a role gap Analysis. Role gap analysis was executed to compare user (management assessment) to IS professional. The comparison of role Gap analysis can be seen in Figure 3. Positive Gap is a condition where the professional IS rating on the system is higher than the user rating, while Negative Gap shows the circumstances in which the professional IS rating is lower than the user rating. Figure 3 shows that all the gaps value are positive. There is a large positive Gap on Useful Information Quadrant which indicates that IS professionals are not aware of the problems encountered by information consumers (Lee, *et al*, 2001). In general, quadrant with a large positive gap should focus on reducing the problem by gaining consensus between IS professionals and information consumers. After consensus is reached, the next focus should be on improving the quality. Incremental improvements are the most appropriate approach for large positive gap. Meanwhile, Dependable Information Quadrant has the smallest gap and is positioned to improve the information quality since consensus about its level is already reached. Problem detected in the role Gap Analysis is the inequality of the assessment between the professional IS and the company management as the user/decision maker, especially in the useful information quadrant, which obtains the lowest value. Based on the useful information quadrant, the information provided by IS professionals through new AIS may lead to different interpretations, with the use of abbreviations and terms in foreign language creating difficulties for the user / decision maker to read and interpret reports quickly. In addition, the new AIS employs international software and the resulting format is not familiar to Indonesian users. Indigestible information will lead to inadequate decisions. The information which is considered as easy to understand by IS specialist, is actually difficult to understand by the user. Beside this, inadequate report output format also needs to be addressed.

The study indicates that the information in the Financial Statements is not presented in a sequence, which would allow the users to directly use the information (in accordance with IAI standards). The main cause of this problem is lack of communication between specialists, incompatible IT systems, insufficient dialogue between information producers and consumers, and time pressure to quickly complete the system. Corrective steps that could be done by this Hotel is to start discussion between IS professional and the users, so that IS professionals can really understand what are the users' requirements to reduce the Gap. Information quality problems often cannot be solved through automated processes and require fundamental analysis of business issues, even to process redesigns (Eppler, 2006). Based on the questionnaire result and role gap analysis, below are the critical actions needed to improve the accounting information system in this Hotel based on priority:

- For short term goal, Hotel should make a glossary to facilitate the users to read/interpret the system output. When users have difficulty reading the output, they can use Glossary as a guide temporarily.
- It is imperative to modify the output format (Conversion), as Glossary alone is not enough to overcome the difficulty in understanding system output. Therefore, IS Professionals should do system conversion to produce output that is easy to understand. This process will definitely take a long time but it is crucial to be done.
- Do programming to calculate the tax in accordance with Indonesian tax regulations.
- Providing training for IS professionals to increase knowledge on Accounting reporting (both Managerial Accounting Reporting and Financial Accounting Reports).
- IQ assessment should not only performed once, but should be done periodically. Indeed, the system improvement can not be done immediately but take a long time and must pass through various stages. To monitor the development of IQ in new AIS, the hotel and IS professionals should continue to request feedback from the users at least every four months.

Conclusion

The AIMQ methodology is useful in identifying IQ problems, prioritizing areas for IQ improvement, and monitoring IQ improvements over time. The problems identified in the Hotel of study are dissatisfaction of users with the output display of the AIS System and a gap between the IS professional and the users' assessment. The most quadrant requiring improvement is Useful Information. AIMQ methodology must be done periodically and is recommended to reevaluate every four months for continuous monitoring. For further study, Benchmarking Gap Analysis may be performed using dimensions related to big data analysis and cloud computing.

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