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ANALYZING INFORMATION SYSTEM NEEDS IN IMPLEMENTING INTERNAL QUALITY ASSURANCE SYSTEM: A STUDY ON HIGHER VOCATIONAL EDUCATION IN WEST SUMATERA, INDONESIA

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ABSTRACT

The increasing demand of qualified skilled labor encouraged Indonesian government to improve the number and quality of vocational education in Higher Education Institutions (HEIs), in the form of diploma study programmes. However, the overall qualities of diploma study programs are still low, even though quality assurance (QA) system has been an imperative to all HEIs. It can be seen from 1) the number of accredited diploma study programs with "A" marks which is small (only 5.67%, nationally; and 3.85% within West Sumatera Province) and 2) the accreditation marks have not continually improved year to year as expected. Several studies about QA in Indonesia show that Internal Quality Assurance System (IQAS) has not been implemented properly by most of HEIs. Some other literatures encouraged IS utilization to support IQAS implementation, but have not indentified the specific requirement of IQAS information system (IQAS-IS) for proper IQAS implementation. This study aimed to perform information system needs analysis in IQAS implementation and IQAS-IS requirement specification. Surveys and interviews were conducted to collect data about the problems in implementing IQAS, and the solutions purposed by respondents. Then, the data analysis is conducted using fault tree analysis followed by five whys technique. From this study, it is concluded that the root causes of the IQAS improper implementation are 1) lack of leader's commitment; and 2) lack of well designed information systems. Those two factors should be developed simultaneously. This study gives contribution in IT research by identifying needs for IQAS-IS, and its requirement specifications, they are namely: supporting IQAS implementation as an integrated process management (a continous full cycle of processes that consist of IQAS planning, implementing, evaluating, controlling and improving), enabling interoperability between different system, and facilitating real time data processing and information retrieval. Thus, by proper IQAS implementation hopefully HEI's will gain quality improvements.

Keywords: *Needs Analysis, Internal Quality Assurance System, Information System, Higher Vocational Education, Interoperability, Integrated Process Management, Automated Data Collecting, Real Time Data Processing*

1. INTRODUCTION

Indonesian government encouraged to improve the number and quality of vocational education in Higher Education Institutions (HEIs), in the form of diploma study programmes [1] to match the increasing demand of qualified skilled labor. Even though the quality assurance (QA) system has been an imperative for all higher education institution, the overall qualities of diploma study programmes are still low. Based on accreditation results, not many of them have gained 'A' remarks (5.67%, nationally; and 3.85% within West Sumatera Province) (processed from [2], [3]). The accreditation system had been utilized by Indonesian government to improve the quality of higher education system since the beginning of 21st century, however after almost twenty years being

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practiced, the quality hadn't been being significantly improved.

According to the regulatory policies set by the government [4], Quality Assurance (QA) System consists of 1) Internal Quality Assurance System (IQAS) that is QA conducted by HEIs; 2) External Quality Assurance System (EQAS) as an assessment of HEIs' IQAS implementation, held by accreditation institutions, such as *Badan Akreditasi Nasional – Perguruan Tinggi (BAN-PT)*; and verified by 3) HEIs Data Center or *Pusat Data Perguruan Tinggi (PDPT),* previously called *EPSBED*. Supposedly, IQAS has an implementation cycle that is in the form of plan, do, check and action (PDCA) against standards.

Several studies found improper implementation of IQAS in most of HEIs in Indonesia. According to Ikhfan Haris, IQAS has not fully implemented, compared to external QA (accreditation) activities [5]. Mohammad Faisal Amir noticed that submission for BAN-PT accreditation does not begin with the construction of internal QA. The study programmes were only busy preparing documents prior to accreditation activities only, and after that, there were no following-up QA activities conducted [6]. Supposedly, the submission of BAN-PT accreditation required study programmes' long-term planning. However, Ghafur found that self evaluation was conducted without planning the standards [7].

An alternative way that has reccommended to support the implementation of internal QA system (IQAS) is the utilization of information systems. Some benefits of information systems utilization in organizational management have already acknowledged, such as: 1) reducing costs; 2) reducing errors; 3) increasing the speed of activity, 4) improving planning and management control [8]. According to Gasskov, vocational education and training (VET) institutions require information system to support effective governance and help reporting and accountability to external parties, and one of them is information system for QA. The QA information system at VET institutions should include QA standards and performance benchmarks, and enable tracking of the achievement of standards and performance [9]. A proper management information system can be a valuable tool in the integrated higher education management, that also serves the continuous improvement of quality assurance, budgeting, and human resources management [10]. HEIs should pay special attention to the establishment of information systems for gathering, storing, searching, using and exchanging information from the internal and external environment among all stakeholders in order to achieve the strategic goals of the higher education institutions, satisfaction of the needs of stakeholders and continuous improvement of the quality assurance system [11]. A literature review concluded that ICTs utilization in IQAS is important in collecting and processing various data input [12]. The use of information system in the implementation of QA process is concluded that it can improve the effectiveness and efficiency of processes and support continuous process improvement [13]. Kandil concluded that information system utilization for QA would reduce a lot of fuss, time, and effort, and provide an appropriate environment for the rapid exchange of information and views about institution's performance [14].

Several studies that focused on designing or developing information system support in HEIs' IQAS implementation are presented in Table 1. Whereas in the field of external quality assurance system, there have been already many studies focused on utilizing information system or information technology for accreditation, as in [15], [16], [17] and many more.

Most studies on information system for IQAS only focusing on some part of the process mangement such as the process of monitoring and evaluation. They do not support the implementation of quality assurance processes in a full and continuous cycle as an integrated process management. Most of the studies also have not identified the specific requirement for IQAS-IS to support proper IQAS implementation.

Needs are the performance gap between the current condition and the desired condition [18], whereas needs assesment is a systematic study of problems or innovation, incorporating data from various sources in order to make effective decisions or recommendations about what should happen next [18]. A needs analysis is performed to analyze the gaps identified through needs assessment, as a root cause analysis for gaps [18]. Taken into account, this study intends to continue the researches on improper IQAS implementation problem ([5], [6], [7]), to identify the causes of the problem. Furthermore, while several studies of IQAS information system (IQAS-IS) have been conducted for the last decade as presented in Table 1, yet they have effected on significant quality improvements. Therefore, this study focuses on improper IQAS implementation problem and analyzes the needs of information system that would be able to support IQAS implementation effectively. This study is

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limited to higher vocational education in West Sumatera, with respondents including coordinator of study programs and chairperson of QA system body in HEIs. This study does not cover the accreditation process as it is part of the external quality assurance system.

The next section describes the material and method of the study. Section 3 reviews the results of the study and discusses some analysis to identify the information system needs, and finally, this article is concluded in section 4.

2. MATERIAL AND METHOD

2.1 Material

Respondents participated in this study were several higher education institutions (HEIs) managing diploma study programmes located in West Sumatera Province. The HEIS participated in this study, maintaining study programmes located in several cities and districts of West Sumatera province as described in Table 2. The respondents were selected by using stratified sampling method, so that the number of samples is obtained. HEIs samples were 24 by 78 and diploma study programmes samples were 56 by 160.

Table 2:.Area Of Respondents

Name of Area	City / District	Number of HEIs maintaining Diploma Study Programs	
		Population	Sample
Agam	District	2	1
Dharmasraya	District	-	-
Mentawai Island	District	-	-
Lima Puluh Kota	District	1	1
Padang Pariaman	District	2	1
Pasaman	District	-	-
Pasaman Barat	District	1	1
Pesisir Selatan	District	-	-
Solok Selatan	District	-	-
Solok	District	3	1
Sijunjung	District	-	-
Tanah Datar	District	2	1
Bukittinggi	City	16	3
Padang	City	40	10
Padang Panjang	City	2	2
Pariaman	City	3	1
Payakumbuh	City	2	1
Sawahlunto	City	-	-
Solok	City	4	1
Total		78	24

2.2 Method

This study consisted of three steps, namely 1) identifying needs; 2) analyzing causes and effects relationships, 3) analyzing information system needs and make recommendations for IQAS implementation successfullness and IQAS IS requirement specifications.

The needs defining process conducted by means of interview and survey. This study was triggered by some reviews found in literatures showing improper IQAS implementation. Based on that, a structured interview was conducted with the chairperson of QA unit, about how IQAS had been implemented, what were the problems and the alternative solutions. The interview results also described how information system is utilized. Then, semi-closed questionnaire was arranged to obtain influencing factors. It was comprised of questions regarding to problem and alternative solution in IQAS implementation along with the options, and it was also allowing the respondents to give additional answers. This questionnaire was filled out by the coordinators of the study programs.

The next process was conducted using Fault Tree Analysis (FTA). FTA was used to model events that causing the undesired events (T) which was "Improper implementation of IQAS" and the cause-consequences relationship between those events. Then, to find the root causes, Five Whys technique was used. The last step was conducted based on root cause analysis. Information system causal factors of QA system successfullness were analyzed and recommendations were made. Based on these, the information system's specification requirements are formulated.

3. RESULTS AND DISCUSSIONS

As this study issued, some new policies and regulations regarding quality assurance system are enforced, including the new accreditation instruments with 9 (nine) evaluation criterias. Although the surveys and interviews of this study are conducted while HEIs still implementing the previous accreditation instruments with 7 (seven) standards of evaluation criteria, the results of this study are still relevance. It is because the main regulations applied are still the same, like the quality assurance system structures, cycle of processes, etc. They differ mainly in the matter of enhanced roles, evaluation criteria classification,

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outcome-based evaluation indicators, and evaluation rubrics, while referring to the new 24 (twenty four) national higher education standards.

3.1. IQAS Business Process

As stated in the regulations, supposedly, IQAS implementation cycle consists of processes, namely IQAS planning (including standards determination or quality level setting), standards implementation, standards implementation evaluating, standards implementation controlling, and standards improving. IQAS implemention should involve various stakeholders and many kind of documentations through continous cycles of sequential processes to gain continous quality improvement. However, the interviews results describe how HEIs have implemented IQAS in their regular basis, and it has found that in general, IQAS implementations are far from the ideal concepts. Table 3 presents the interviews' results related to IQAS business processes in HEIs.

3.1.1. Have the standards been being determined?

In IQAS planning, it is necessary to determine and document IQAS' policies, standards, manuals and forms; of all aspects of HEI's business processes, both in HEI's level and in study programme's level. 37,50% of HEIs participated in this study have standards and they have exeeded the minimum standards determined by government previously in the form of derived standards or additional standards such as international standards. 41,67% have minimum standards ,whereas the rest of HEIs (20,83%) have not set any standards.

3.1.2. Have the determinated standards been being followed by establishing additional documents (manuals / standard operating procedures/ work instructions, forms, implementing organization)?

20,83% of HEIs participated in this study have been supported by additional documents for most of the document's types or standards, whereas 41,67% supported by additional documents for a few document's types or standards.The rest of them (37,50%) have not been supported any additional documents.

3.1.3. Have the standards been being implemented according to schedule and being documented?

Then, it continues with standards implementation. Standards implementation related to performing all HEI's business process activities regarding to the standards that have been set up. All the documentation of every activities of a particular standard that have been performed should be documented as the results and the evidences of the standards implementation. However, only 16,67% of HEIs participated in this study have implemented most of the standards according to schedule and have documented them, and 29,17% have implemented a few standards according to schedule and have documented them, and the rest of HEIs (54,17%) have not implemented standards according to schedule and have not documented them.

3.1.4. Have the standards implementations been being evaluated on schedule and being documented?

Next, the standards implementation evaluation was conducted by measuring standards implementation progress, measuring standards compliance, and measuring results based on customer satisfaction surveys. This process includes HEI's internal audit. All of this process should be documented. However, only 12,5% of HEIs participated in this study had evaluated most of the standards implementations on schedule and have documented them, whereas 33,33% have evaluated a few of the standards implementations on schedule and have documented them. The rest of them (54,17%) have not yet evaluated standards on schedule and/or documented them.

3.1.5. Have the standards implementation been being controlled on schedule and being documented?

12,5% of HEIs participated in this study had performed standards implementation controlling for most of standards implementations on schedule and had documented them, whereas 33,33% had evaluated a few of the standards implementations on schedule and have documented them. The rest of them 54,17% have not yet performed standard implementation control on schedule and have not documented them.

3.1.6. Have the standards been being improved periodically?

4,17% of HEIs participated in this study had improved most of their standards periodically or achieved their increased target, whereas 41,67% had improved a few of their standards or achieved their increased target and the rest of them 54,17% had not improved their standards.

Thus, it can be concluded from the interviews that in most of HEIs, IQAS has not being implemented as a full cycle of sequential processes. Although the standards are set, bad implementation occured, there are no long term plannnings to improve the standards from time to time. Therefore, quality asurrance system is going no where. There is no possitive effect in implementing IQAS. It

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indicates that there are some problems in implementing IQAS. Thus, the interviews resulted in IQAS implementation need namely "all sequential processes of internal quality assurance are performed as a full cycle, continously".

3.2. Problems in Implementing IQAS

The surveys show that from the perspective of respondents there are several problems in implementing IQAS that may contribute to improper IQAS implementation. The top five problems identified by respondents are 1) Inadequate number of supporting human resources (46%); 2) Not well managed documentation (46%); 3) Difficulties in gathering data from other units (44%). 4) Busyness with academic activities (43%); and 5) Data need to be processed first (30%). Figure. 1. presented those results that derived from selecting the provided answers. It shows the percentage of number of respondents who chose the option devided by total of respondents. Besides those answers, respondents can give additional answers based on their own opinions regarding problems in implementing IQAS, as presented in Table 4.

Related to documentation issues, the surveys results show that respondents stated that 'documentation is not well managed' (46%), and they are also facing problems such as 'inadequate facilities' (26%) like representatives and dedicated rooms, filling cabinets for storing documents / archieves, etc. Whereas at some points in IQAS implementation cycle, 22% respondents stated that they are facing the problem of 'not knowing the current quality achievement', and usually, to obtain that sort of information they find difficulties in collecting data from other units (outside of their study programmes) (46%). Then, after the data have been collected, usually they can't immediately use the data without processing them (30%). However, there are also respondents stated about 'not knowing the procedures' (26%),'busy with academics activities' (43%), 'inadequate human resources' (46%) or 'lack of qualified human resources' (20%) that led to not conducting IQAS processes properly. The two last processes in the cycle namely standards implementation controlling and standards improving are suffered those problems faced by the previous processes. The main problems in these two phases are unavailability of accurate, timely, and adequate information about standards compliance and quality achievements. It makes these two processes become not being conducted smoothly and effectively.

3.3. Solutions Suggested By Respondents

The respondents suggest some opportunities in solving the problems. Figure 2 presents solutions sugested by respondents by selecting provided answer, whereas Table 4 presents additional suggestions from respondents' own opinions. The solutions recommended by more than half of respondents are: 1) The addition of human resources with the specified qualifications (76%); 2) Trainings (for management level: 74%, for staff level: 58%); 3) Better cooperation and collaboration with other units (68.%); 4) Facilities for better documenting, data processing and information retrieval (55%); 5) Representative facilities and equipments (53%).

3.4. Fault Tree Analysis (FTA) Results

FTA is constructed by placing all possible causes of improper IQAS implementation problem identified by the surveys. They become the basic events that contributed to fault in FTA. They are grouped to some categories of events namely: "Inadequate competent human resources", "Lack of supporting facilities", "Lack of leaders' commitment" and "Unavailable information". The list of events of possible causes in FTA is presented in Table 6.

3.5. Root cause of Improper IQAS implementation problem

The root causes are identified by further analysis on FTA using Five Whys technique, to generate further causes to the problems and relate these to each other. Table 7. presents examples of finding the root cause by using Five Ways technique.

Several events are namely: "Lack of socialization about quality standard and policy" (E6), "Unclear and sudden information about monitoring and evaluation schedules and activities (E7)", "Different perception during monitoring and evaluation between auditees and auditors" (E8) caused by "lack of sosialization**".** Several events are namely "Lack of discipline" (E4) and "Busy with academic activities" (E5) and lack of sosialization caused by the "lack of staff's commitment". Several events are namely: "Not understanding the procedures (E3)", "Inappropriate qualification of human resources" (E1), and "Inadequate number of human resources" (E2) "Inadequate fundings" (E12), "Inadequate facilities" (E11), "Slow information distribution / Lack of coordination" (E9), "Lack of supporting policy and regulation" (E10) and lack of staff's commitment caused by the lack of leader's commitment. It is concluded that the root cause of these events is the lack of leader's commitment.

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Several events are namely: "Not knowing current quality achievement" (E13), "Raw data needs processing" (E14), "Different data format needs processing" (E15) caused by "Unhandled data processing". Whereas events such as "Difficulties in gathering data from other units" (E16), and "Not well managed documentation" (E17) caused by "Unintegrated data". These events shows that information systems that has been used (if any) are not well designed to support the IQAS implementation effectively.

The resulting fault tree (Figure 3.) shows that the root causes of the improper IQAS implementation problem are: 1) lack of leader's commitment, and 2) lack of well designed information system support.

3.6. Needs of Information Systems in IQAS implementation

The interview results also describe how HEIs has utlized information system in IQAS implementation. It is found that most of HEIs (95,83%) have already utilized information system in managing their data and information for each of their business process separately, such as academic, library, finance, human resource, research and comunitity services, etc, and only 4,17% have not yet utilizing information system in managing their business processes. But those information systems are not integrated each other and/or with information system dedicated for IQAS (if any). Therefore, the data collected in each of these ISs is only available for the HEIS's unit/ study programmes which are the user of the particular information system, without providing any efficient mechanism for data sharing with other units / study programmes. Only a few number of HEIs (12,50%) have already utilized information system or applications dedicated for IQAS implementation, but it is still limited to monitoring and evaluation process. None of the HEIs has utilized information system to support IQAS as a full cycle of sequential processes.

The needs analysis using FTA followed by FiveWhy's technique, shows the needs of well designed information system support for effective IQAS implementation. In overall, the needed information system supports should satisfiy several requirements, namely:

1. handling IQAS implementation as a continous cycle consist of sequential processes.
2. enabling interoperability between study programmes and other related units or information systems within HEIs to improve data integration by efficient data collecting.
3. facilitating real time data processing and information retrieval, involving :
   - IQAS documents (policies, standards, manuals, and forms) and other HEI's supported documents;
   - all IQAS processes' documentations as IQAS implementation evidences.
   - information about standards implementation progress, standards compliance or quality achievement, and quality assurance results based on customer satisfaction surveys.
   - information for IQAS implementation coordination purpose such as meetings, task's assignment, task's schedules, and task's results
   - valid and updated data of HEI's data center in HEI's level to be used in accreditation purpose;

These requirements should be fulfilled by addressing some technical barrier. It is due to the technology architecture or system development method which is not allowing easiness in integration and collaborations among different systems, platforms and formats.

4. CONCLUSIONS

From the study, we learn that the need of IQAS implementation in HEIs is "performing IQAS in a full cycle of sequential processes, continously". The root causes of this improper IQAS implementation problem is lack of leader's commitment, and lack of well designed information system support. Information system requirment specification for IQAS implementation are characterized by the ability of supporting IQAS process in full cycle continously, enabling interoperability between different technology, and facilitating real time data processing and information retrieval.

This study gives some recommendations for IQAS implementation successfullness. *First*, HEIs' leaders should improve their commitment as it is the key driver in IQAS implementation. *Second*, Quality asurance officials and IT managers in HEIs should sit together and discuss about detail information system requirements and contraints in supporting IQAS implementation. *Third*, as new policies and regulations regarding to quality assurance system enforced by government, this is the right time to redesign information system according to the proposed characterististic in this study, while adapting to those new regulations. *Finally*, along with IQAS-IS implementation, the

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corresponding regulations and controlling system should be enforced.

This study has given contribution in IT research by identifying and analyzing the needs of information system utilization for more efficient and effective internal quality assurance system. It also formulate requirement spesification for the IQAS IS proposed.

The limitations of current knowledge are some technical barriers that are not allowing easy integration and collaborations among different systems, platforms and formats. As this study has encouraged to develop well designed information system, therefore, the next study will adopt interoperability capabilities in the future IQAS-IS design, to support data collecting automation among all related units in HEI despite of the various technology that they have been used. It also allow real time data processing and information retrieving. The proposed information system will be modelled as an integrated IQAS-IS by using an enterprise architecture framework. In overall, the importance of this study is as the entry point for other studies that will define objectives, design and develop, demonstrate, and evaluate the information system utilization solution for improper IQAS implementation problems.

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Table 1: Research Map of Information System Support Development for IQAS Implementation in Higher Education

Research	Main idea
[13]	Develop an information system to automate process management of quality assurance in university which is related to modeling, design, execution, and monitoring activities. The approach used is service oriented architecture (SOA).
[14]	Develop an information system prototype for process evaluation of quality assurance in a higher education institution, which focuses on self-evaluation stage and external evaluation stage.
[19]	Build an automated system for quality assurance in higher education using data mining.
[20]	Propose a framework for the quality assurance of a higher educational institute including all the relevant roles and responsibilities of the administration hierarchy, It is based on a four layers architecture, which consists of data collection, data mining, decision support, and the monitoring of the KPI's.
[21]	Propose a quality assurance framework supported by strategic information system. It integrates strategic management, process management and monitoring measuring management system as well as take into consideration international, national, regional, external factors.
[22]	Construct of data management platform for quality assurance system using big data technology.
[23]	Develop and evaluate a computer platform using Business Process Management (BPM) tools in Quality Assurance System implementation in a university. It proved efficient. It concluded that Quality Assurance Systems, and the overall functioning of organizations, may be supported by Business Process Management (BPM) software systems, in which: a workflow engine should be used; process development should be documented with evidences that should be stored and organized in a structured content repository. The users' experiences prove that a computer supported quality system based on BPM facilitates the compliance of quality processes and allow further improvement of the whole quality system and its processes.
[24]	Identify the general requirements of a quality assurance management system data management tool, develop user interface and a model for HEIs. It also provides different user levels to use the quality assurance management system to maintain confidentiality and creditability.
[16]	Develop a framework for an intelligent information system that manages the quality assurance in higher education's institutions, in oder to provide an automation tool that avoids unnecessary and redundant tasks associated to quality in higher education institutions. It helps all higher education stockholders to handle and monitor their tasks, and to apply their quality's standards and to make sure that they are being maintained and enhanced.
[25]	Develop a metamodel using Model Driven Architecture (MDA) in (AQA) that can be configured to implement academic quality assurance application software based on information system (IS) platform.
[26]	Develop a web-based information system to facilitate internal quality audits based on the ISO 9001: 2008 clauses and national education standards by providing information, guidelines, assessment criteria, answers, reports, responses and monitoring of findings
[27]	Develop human resource quality assurance information systems in higher education institutions.
[28]	Design a dashboard system for performance monitoring and evaluation based on key performance indicators (KPI) of the university.
[29]	Develop dashboards to support monitoring activities of students and graduates by each study program using business intelligence and also provide predictive information to support decision making for study programmes' top level management.
[30]	Develop a web-based internal quality assurance information system software prototype according to the latest national higher education standards.
[31]	Develop study programme dashboard performance to provide information to study programme managers, faculties and universities on the quality achievements of study

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	programmes, covering all criteria in the accreditation standards for undergraduate programmes
[32]	Build an information system for Internal Academic Quality Audit that can integrate data owned by clients with academic quality documents needed for academic audit needs.
[33]	Develop an online internal quality assurance information system that allows evaluation of the teaching and learning process of lecturers, and management of evaluation results as part of the IQAS activity cycle at the end of each semester.
[34]	Develop information systems to facilitate the implementation of internal academic quality audits so that document checking and data processing become faster and easier to do.
[35]	Develop prototype of web responsive quality assurance information system that provide services in the form of monitoring and evaluation supporting document management.

Table 3. Interview's Results Related To IQAS Business Processes

Questions	Answers		
	Yes (beyond minimum /most of)	Yes (minimum / a few of)	No
Have the standards been being determined?	37,50%	41,67%	20,83%
Have the determinated standards been being followed by the establishing additional documents (manuals, standard operating procedures, work instructions, forms, implementing organization)?	20,83%	41,67%	37,50%
Have the standards been being implemented according to schedule and being documented?	16,67%	29,17%	54,17%
Have the standards implementations been being evaluated on schedule and being documented?	12,50%	33,33%	54,17%
Have the standards implementation been being controlled on schedule and being documented?	12,50%	33,33%	54,17%
Have the standards been being improved periodically?	4,17%	41,67%	54,17%

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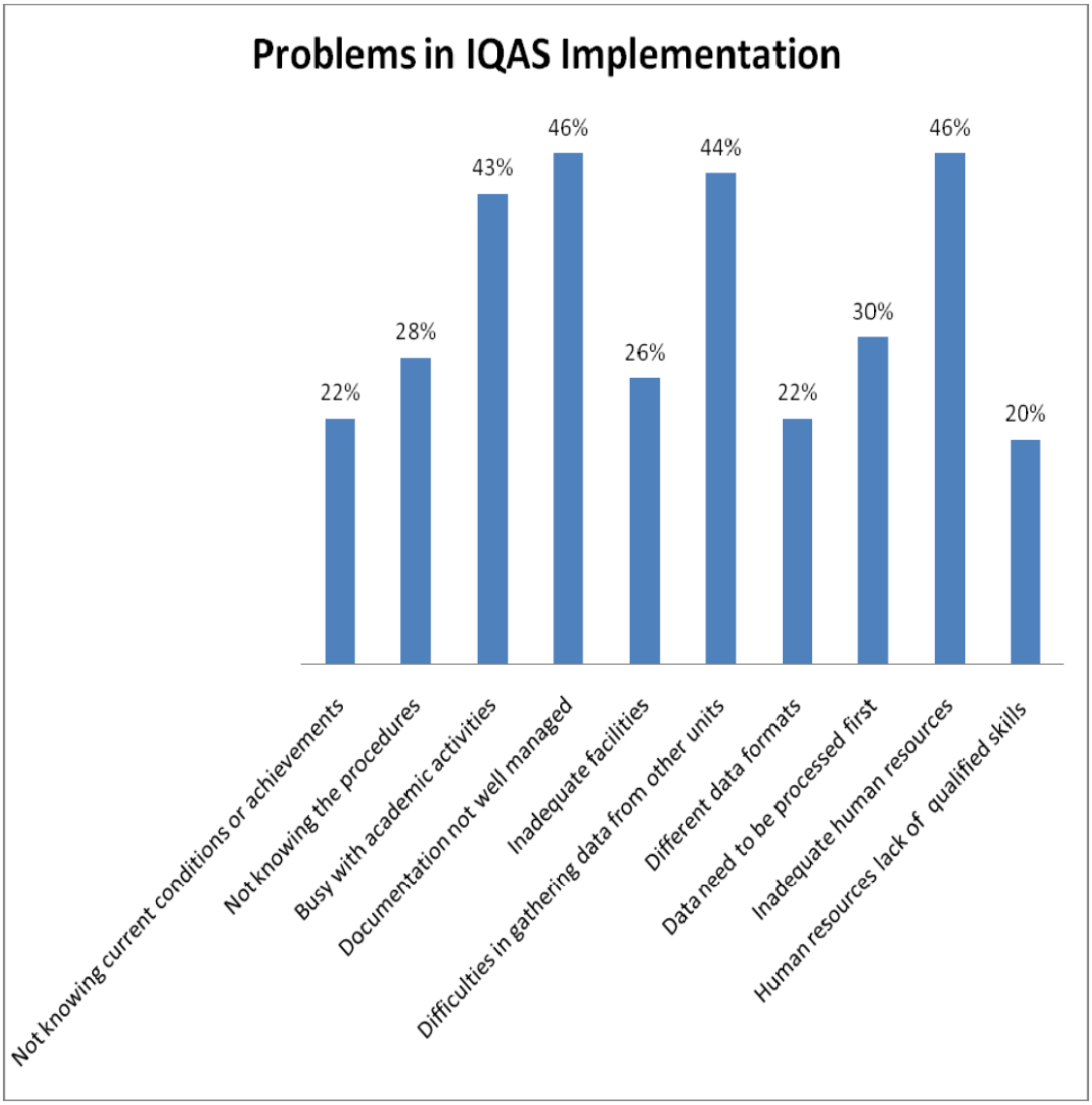

Figure 1: Survey Results About Problems In Implementing Iqas (By Selecting Provided Answer)

Table 4. Additional answer (respondent's own opinion) regarding problems in implementing IQAS

Additional answer (respondent's own opinion)	**Percentage**
Lack of leader's commitment for financing	2%
Lack of leader's commitment for infrastructure	2%
Lack of socialization about quality standards	2%
Lack of socialization about quality policy	2%
Lack of socialization about monitoring and evaluation activities	2%
Lack of information about standards implementations because data has not yet processed	2%
Supporting policy, regulations and guidelines are still weak	4%
Slow information distribution / lack of coordination	2%
Lack of socialization about monitoring and evaluation schedules	4%
Lack of lecturer's discipline in administration	2%
Different perceptions about audit in monitoring and evaluation between auditee and auditor	2%

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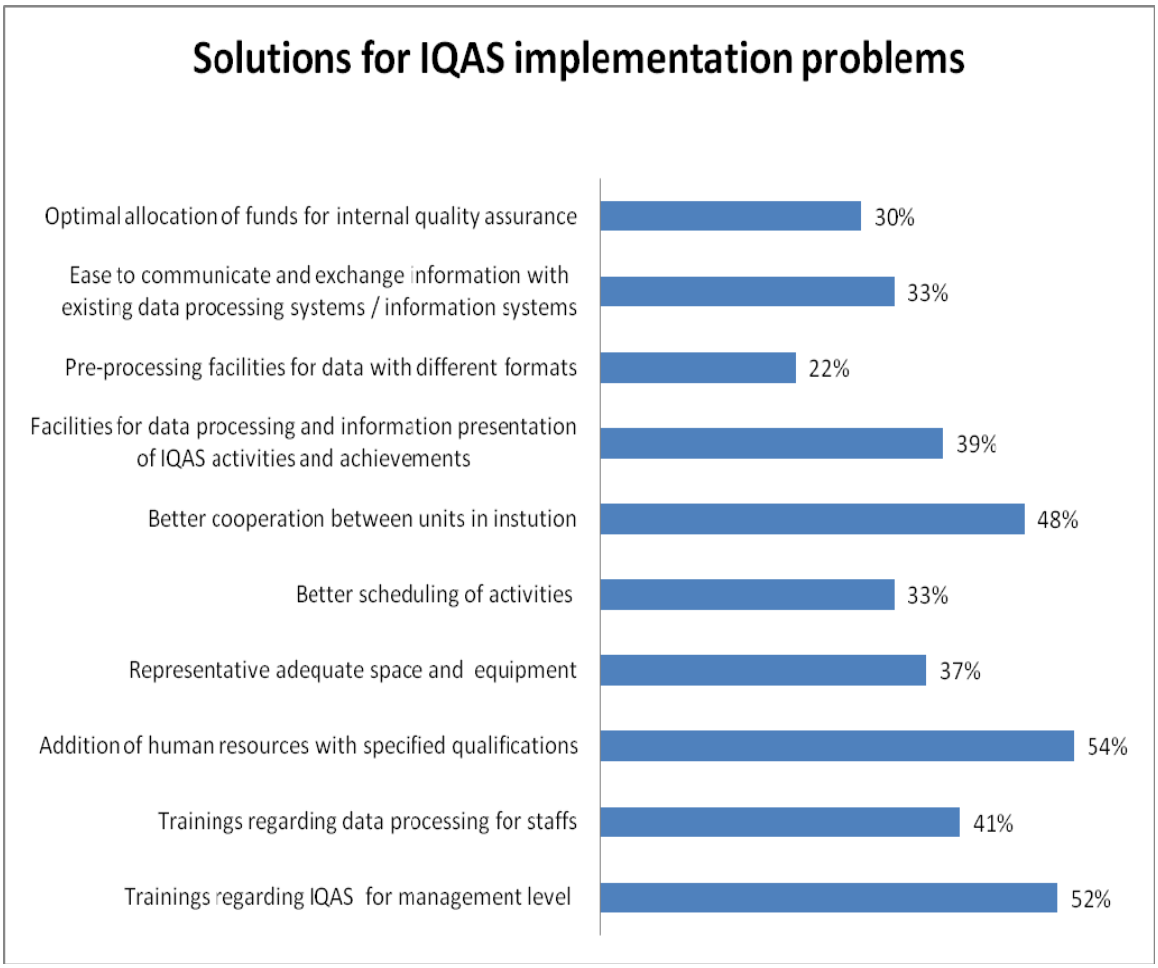

Figure 2. Suggested solutions to improper IQAS implementation problems (by selecting provided answer)

Table 5. Additional suggestions for IQAS implementation problems

Solutions	**Percentage**
Standardizing formats of data and document	2%
Allocating time, budgets and efforts for data processing	2%
Online and integrated data	2%
Provide easiness for study programmes to get data / information directly and fast	2%
Provide online IQAS documents for all study programmes/units	2%
Commitment in conducting IQAS	2%
Involvement of all academic community in conducting IQAS	4 %
Commitment and support from leaders in conducting IQAS	4 %
Socialization of standard operating procedures and rules in IQAS implementation	2%
Maximizing the work of IQAS unit staffs in study programmes	2%
Socialization and training for IQAS unit staffs in study programmes	2%
Routine meetings for IQAS from study programme level to HEI level	2%

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Table 6. Events of improper IQAS implementation problem

Symbol	Description
T	Improper IQAS implementation
G1	Incompetent human resources
G2	Lack of leader's encouragement
G3	Lack of supporting facilities
G4	Unavailable information
E1	Inappropriate qualification of human resources
E2	Inadequate number of human resources
E3	Not understanding the procedures
E4	Lack of discipline
E5	Busy with academic activities
E6	Lack of socialization about quality standard and policy
E7	Unclear and sudden information about monitoring and evaluation schedules and activities
E8	Different perception during monitoring and evaluation between auditees and auditors
E9	Slow information distribution / Lack of coordination
E10	Lack of supporting policy and regulation
E11	Inadequate facilities
E12	Inadequate fundings
E13	Not knowing current quality achievement
E14	Different data format needs processing
E15	Raw data needs processing
E16	Difficulties in gathering data from other units
E17	Not well-managed documentation

Table 7. Example of finding the root cause by using Five Whys technique

Event as Possible Cause		5 Whys
E7	Unclear or sudden information about monitoring and evaluation schedules	Why?: Lack of socialization Why?: Changing schedule Why?: Bad planning Why?: Lack of staff's commitment Why?: Lack of leader's commitment
E16	Difficulties in gathering data from other units	Why?: Unintegrated data that are spread across units within HEI Why?: Diversity and incompatibility of technology, Why?: System is built separately, Why?: System development method does not consider collaborations Why?: Lack of well designed information system

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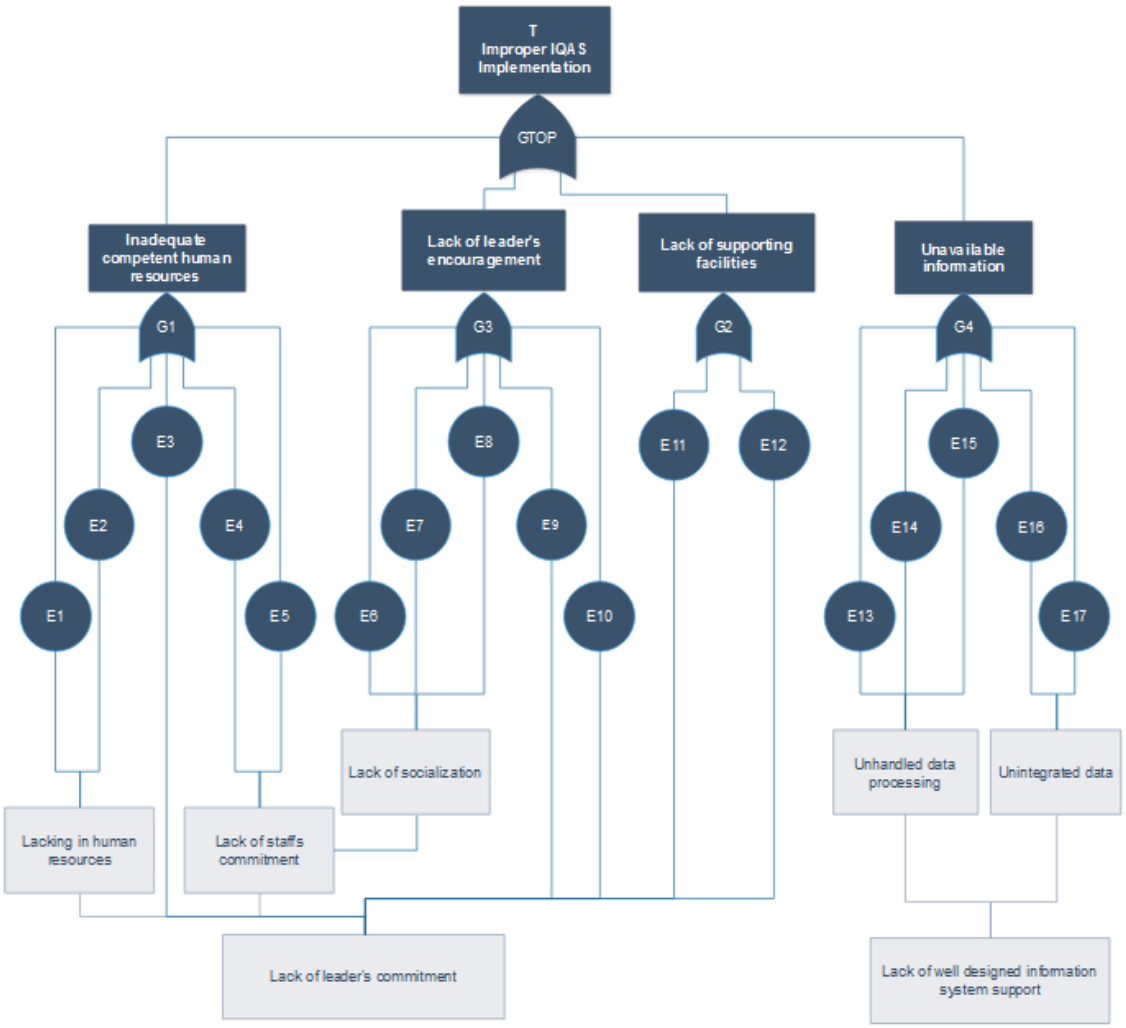

Figure 3: Fault Tree Analysis followed by FiveWhys technique of Improper IQAS implementation problem