

## A Review on Quality Management Systems Maintenance Framework based on Process Based Management, Knowledge Quality and Knowledge Self-efficacy

Ishamuddin Mustapha<sup>a,b,\*</sup>, Ahmad Jusoh<sup>a</sup>, Khalil Md Nor<sup>a</sup>

<sup>a</sup>Universiti Teknologi Malaysia, 81310, UTM Johor Bahru, Johor, Malaysia

<sup>b</sup>Universiti Kuala Lumpur, Bandar Seri Alam, 81750, Johor Bahru, Johor, Malaysia

\*Corresponding author: ishamuddin@unikl.edu.my

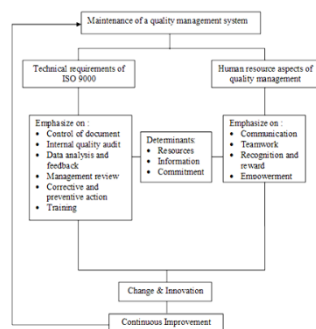
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### Graphical abstract



### Abstract

The Quality Management Systems (QMS) maintenance issue during post certification of ISO9001:2008 is an important issue to the business community. There are many certificates which have been withdrawn by the certification body from the ISO9001:2008 certified companies. This situation has initiated interest amongst academicians and industry practitioners to develop the QMS maintenance framework. An extensive literature review conducted on research work in QMS field has shown that there are deficiencies in the current QMS maintenance frameworks. The deficiencies shed light to improve the current QMS frameworks by integrating Knowledge Management (KM) element and indirectly address their limitation. This paper reviews the existing QMS maintenance framework and proposes new elements to the framework. Based on the literature review, new variables which are knowledge quality (KQ), knowledge self-efficacy (KSE) and process based management effectiveness (PBME) are potential elements that can be introduced in the framework.

**Keywords:** Quality management systems maintenance; process based management; knowledge quality; knowledge self-efficacy

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### 1.0 INTRODUCTION

Most of organizations nowadays embark on the concept of Quality Management Systems (QMS) through ISO9001:2008 certification. The adoption of QMS through the certification of ISO9000 family standard has become common and a must to all organizations especially in the current competitive business environment [1]. In the context of Malaysia, 10,757 certificates were issued to organizations in 2011. The growth rate of ISO9000 certificates for Malaysia is around 28.5% per year from 1993 to 2011 [2]. In Asia, Malaysia is placed at 5th behind China, Japan, India and South Korea. This statistics shows that ISO 9000 standard is widely accepted in Malaysia. Unfortunately, in Malaysia, there are companies which are unable to maintain their QMS. Statistics shows that 2,461 certifications have been withdrawn from 2006 to 2011 [2].

The certification body will withdraw the certificate from the organization if there are significant evidences that the organization fail to maintain the QMS. Sustaining QMS in the organization through proper maintenance of ISO 9000 certification will ensure all benefits and gains will be prolonged [3]. The consequences of

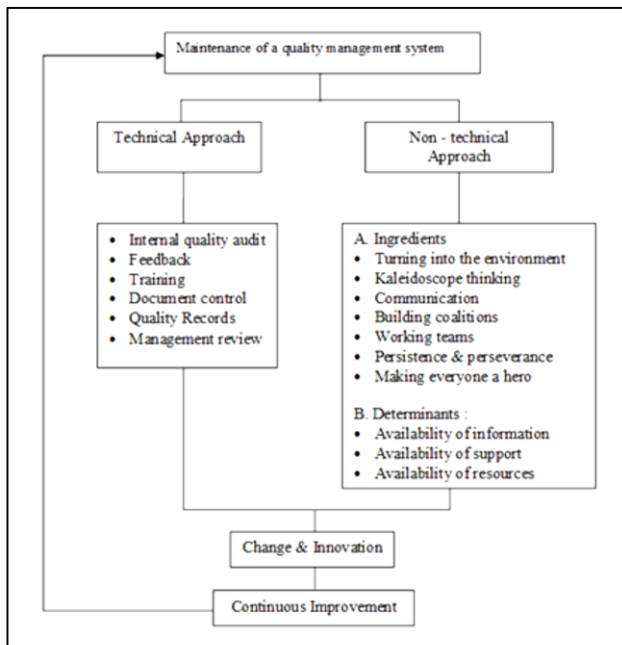
failing to maintain the QMS is tremendous to the organization where the company reputation, customer loyalty and the overall performance of the organization can be affected [4]. This issue is very important to the business communities, authority, certification body and the customers indirectly. Low and Omar addressed that to avoid withdrawal of ISO 9000 certificate, the QMS shall be maintained accordingly [3]. Failing to maintain or sustain the certification means that the organizations fail to fulfil one or more of the important elements in QMS, thus giving indicator that the organizations have some weaknesses to maintain the quality systems developed.

The maintenance phase differs from the other stages of QMS implementation in several ways. The QMS maintenance phase begins once the QMS is in place where compliance with the ISO 9001:2008 standards needs to be continuously undertaken by the organization. In the maintenance phase, the system needs to be continuously improved and enhanced (as required in the ISO 9001:2008 requirement Clause 8.5.1, Continual Improvement). This phase is never ending as to keep the systems alive where it requires continuous improvement in process, system, people and product or service. This can be demonstrated in the setting up of

initiatives such as improvement projects or program by individuals or in teams. In maintaining QMS, organizations have to show that they are proactive in anticipating what might occur in the future and in anticipating potential problems before they occur by taking preventive action and followed by conducting effective and periodic internal audits as to verify adherence to the QMS standards [5].

**2.0 THE QMS MAINTENANCE FRAMEWORK**

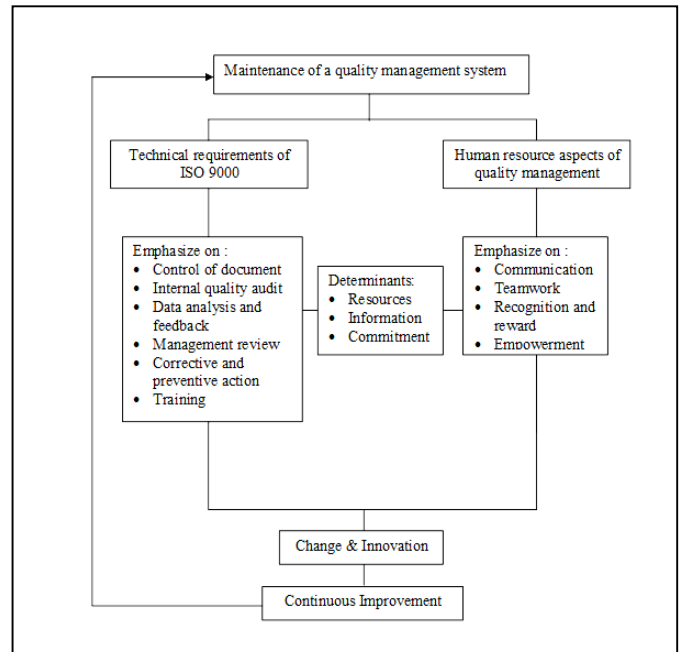
Extensive review of previous researches on QMS area indicated that effective QMS maintenance was not an interest of previous researchers [6]. Furthermore, the review also showed that the QMS framework was not extensively explored except only by few researchers such as Wahid [7] and Kanter [8]. Kanter had developed the QMS maintenance framework that consists of two main technical and non-technical components. For the technical component, Kanter suggested that organizations are expected to maintain their respective systems by following the requirements set in ISO9000 standard. The respective technical requirements in ISO9000 which organizations should be focused on are the internal audits, training, document control, quality record and the management review. On the other hands, the non-technical component suggested by Kanter to maintain the QMS within the organization is through change and innovation. The proposed framework by Kanter is shown in Figure 1.



**Figure 1** Kanter's (1994) framework towards effective maintenance of quality management systems

As highlighted above, Kanter has listed two components, i.e. change and innovation, which need to be undertaken and emphasized by the organization. These components are turning the quality-related ecosystem towards satisfying customer needs, having kaleidoscopic thinking, effective communication, building coalitions amongst supplier and customer, highly cooperative working teams, maintaining persistence and perseverance in all situations, and last but not least making everyone important and belief that they are heroes. Kanter also noted that this non-technical component should be supported by few important elements within

the organization which are the availability of information, support and resources. However, the authors opined that the framework developed by Kanter has some limitations which shed light for new improvement opportunity as been made accordingly by Wahid through her suggested framework as shown in Figure 2.



**Figure 2** Wahid's (2012) Framework for effective ISO 9000 maintenance in service

In the framework developed by Wahid , the maintenance process of quality management systems shall be carried out by undertaking two main initiatives within the organization which are the fulfilment of technical requirements of ISO9000 (technical aspect) which are similar to Kanter's idea and the human resource aspect of quality management (the new contribution by Wahid). In developing the framework, Wahid further argues that, Kanter's model does not address on data analysis and human resource aspect particularly the empowerment aspect. Her findings show that certified organizations must go beyond maintenance to effectively maintain their ISO 9000 in order to obtain long-term benefits. Apparently, she also highlighted that data about the process, system, and customer need to be collected and analyzed and top management shall take seriously on the internal and external audit report. Wahid stresses that for the fulfilment of technical requirements of ISO9000, organizations shall emphasize on several area which are the document control, internal quality audit, data analysis and feedback, management review, corrective and preventive action and training. For human resources aspect, Wahid has suggested that organizations shall make sure that they emphasize on communication, teamwork, recognition and reward as well as empowerment. In the framework, Wahid has put resources, information and commitment as the important determinants for both technical and human resource aspect of the maintenance of QMS. By having both technical and human resource aspect in place, Wahid believes that organizations will be able to initiate change and innovation amongst the organizational community and initiate continuous improvement as to ensure the success of QMS maintenance.

The technological, business and economic changes and challenges require the QMS maintenance framework to be frequently improved and enhanced. We have examined these frameworks and found some limitations and room of improvement towards successful implementation by organizations.

### ■3.0 QMS MAINTENANCE FRAMEWORK LIMITATION

Reviewing the problem associated with the existing Wahid's and Kanter's QMS maintenance frameworks has led us to focus and divide the problems into two main context which are the functional aspect of the framework as well as the critical factors within the framework itself. From the functional aspect, we argue that Kanter and Wahid only addressed that to maintain QMS, organizations shall confirm to all ISO9001:2008 requirements which is something that is clearly understandable. Kanter and Wahid do not address the importance of managing the process and its interaction which will result in compliance to the ISO9000 standard. The important of managing the processes and its interaction within organization is being highlighted and stressed in the ISO9001:2008 standard Section 0.2 and ISO9004:2009 standard.

Generally, Process Based Management (PBM) can be defined as a management of organization by emphasizing on maximizing the efficiency of processes and its interaction and not maximizing the efficiency of departmental or functional units [9]. The management of processes and its interaction is very important to the organization since it forces people to become aware of the link between the activities in the process. PBM is developed based on the belief that a desired result is achieved more efficiently when activities and related resources are thought of as a process [10]. This is supported by Fisher [11], who stated that the identification and management of processes in an organization are essential interpretation of the ISO 9001 standard. Without proper management of the processes and its interaction, it will be difficult for organizations to comply with the technical requirements since the compliance of ISO 9000 standard requirements are complex and provides significant problem to the organization and their respective staff. The PBM in nature is flexible where individuals work towards completing overall process rather than one particular activity. PBM emphasizes the importance of understanding and fulfillment of requirements, the need to consider processes in terms of added values, obtaining results of processes and continual improvement of process based on objective measures [12]. In PBM, employees are cross-trained and are aware of all steps in the process of providing products or services to customers compare to traditional functional management method which employee will only specifically trained in more specific area. In other words, the organization's operation will not be managed through functions or department available within the organization; instead the organization's operation will be managed based on the processes available within the organization. In this context, we believe that PBM can be included in the QMS maintenance framework, the element that drives the organization in fulfilling all the requirements set in the standard.

The aforementioned argument is further supported by previous researchers in this area, who have found that, some of ISO9001:2008 requirements are difficult to comply without proper management of processes. For instance, Chin *et al.* [13] found that, among the clauses (requirements) under the ISO9000 standard, 73.61 percent of the surveyed companies feel that the "corrective and preventive actions" is the most critical issue in maintaining the ISO9000 requirements. Chin *et al.* [13] also found that control of document and record, internal audits, quality management system general requirements, and management responsibility are amongst other clauses which are difficult to maintain. In Malaysia, Yahya

and Goh [14] conducted a study on Malaysian manufacturing companies and found that seven clauses that are the most difficult to satisfy are corrective and preventive actions, design and development, management responsibility, statistical techniques, process control, document and data control, and quality system. Those above issues may arise if the processes and the interaction between each process during the operation of the company are not managed effectively. For instance, the lack of process interaction control between the internal audit process and the corrective and preventive action undertaken will result to high chances of nonconformity towards the ISO9001:2008 compliance. This situation occurs when the management of this process is being managed functionally. It means that the issues raised during the internal audit activity are being managed in "silos" without considering the next required process of issuing the corrective and preventive action towards improving the systems. In addition, "silos" generates introspective view that discourages the transfer of information, sharing knowledge and diminishes the teamwork culture [15].

In her framework, Wahid also left behind the important elements that ensure the QMS to be more dynamic and responsive to any challenges faced by organizations nowadays. The elements within the framework developed by Wahid such as the technical requirements and the human resource aspect are not able to initiate the dynamic and responsive QMS upon any changes and challenges on business environment and technology. According to Stewart [16], the QMS must be constantly dynamic in order to improve the quality of both the company's internal and external services by constant monitoring, controlling, assessing and improving the QMS through both the technical and non-technical approaches. This is supported by Marín and Ruiz-Olalla [17] who described effective QMS shall be dynamic, able to adapt and change to meet the needs, requirements and expectation of customers. We believe that the element of knowledge particularly the quality knowledge should be incorporated in the QMS framework to establish dynamic and responsive QMS. This is due to the fact that through effective creation and transfer of knowledge, organizations would be able to gain competitive advantage and superior performance [18-19]. This is in-line with Ra, Vuk and Indihar's [20] findings that knowledge have a significant effect to the organization performance that frequently facing dynamic challenges. In maintaining QMS, the ability to create new and high quality intellectual property and knowledge as well as capitalizing the intellectual resources is very important for the organization. Although Wahid lists resources as a determinant in her framework, but it does not significantly reflect and lead the focus to knowledge as the main resource for QMS maintenance.

We also found that Kanter and Wahid's QMS maintenance frameworks do not specifically addressed the individual capability issue of the employee within the organization. We believe that the employee capability is crucial to maintain the QMS since they are the one who undertake necessary action on the company's operation as well as all QMS activities. Within the organization, employees work as individual in many ways. They work individually during the procedure and manual write up and during the internal audit exercise (since each auditor have their own scope of assessment, auditor become individual unit in the group of auditor). They also conduct their daily routine task individually based on the job description provided by the management. The employees normally have significant value of knowledge especially in regards to the operational context of the organization. However, there are some employees who do not have enough confidence to make use of their knowledge and this may affect their effective interactions with other fellow employee; hence, QMS activities.

The capability of individuals to identify, acquire, share, preserve and apply knowledge will influence the quantity and quality of knowledge in the organization. To initiate this capability, individuals (in this context is the staff of the organization) should have confidence to transform all data and information to become quality knowledge. We feel that self-efficacy an aspect particularly in sharing and creating quality knowledge related to QMS implementation is very important element that can be incorporated with QMS maintenance. This is due to the fact that organizational knowledge is first acquired at the individual level [21]. This is also in-line with self-efficacy theory where the level of an individuals' confidence will significantly influence what they do [22]. Knowledge self-efficacy has been suggested to have significant relationships with the organizational learning, knowledge sharing and knowledge creation [23-25] that are required to establish the quality knowledge amongst the community.

We also examined on the major QMS problem from the context of ISO9001:2008 certification process which was not extensively explored by the previous researcher and shall be emphasized in the QMS maintenance framework. Within the organization, there are several problems which contribute to the failure to maintain the QMS. The major problems in QMS maintenance arise when the management does not provide full support and commitment for QMS implementation upon receiving the certificate. Lack of top management involvement, lack of understanding of ISO 9000 requirements for the quality systems, the lack of effective internal corrective measures to maintain their quality systems after ISO 9000 registration is the common problem to sustain QMS [26]. These situations happen when the top management is focusing only on the tangible benefits rather than the overall values of implementing QMS. Casadesus and Karapetrovic [27] found that registered companies perceive fewer benefits from the QMS implementation thus reducing the effort to sustain the QMS. The top management may only more focus on the financial wealth of the company without realizing that the QMS contribute significant effect to the organization performance. From our experience who involved directly in developing and maintaining QMS in several certified organization, some interesting occurrences in the organization related to the QMS maintenance can be observed. Top management usually will focus on QMS if there are any upcoming audit exercise and always forget their roles as stipulated in the QMS principles to give full commitment and involvement in QMS process throughout the maintenance period. Without top management support and commitment, the monitoring aspect of the QMS, the required resources and the continual improvement cannot be implemented successfully. Lack of management support and commitment may due to low understanding on the QMS concept and methodology. This situation happen when the knowledge acquired or being transferred during the awareness and interaction session to the top management and senior officer on QMS and operation was too brief, basic and not meeting the characteristic of quality knowledge (intrinsic, contextual and actionable knowledge) which is very important in maintaining the QMS [28].

Another issue pertaining to the QMS maintenance is related to the problem in maintaining the documentation requirements as stated in ISO9001:2008 standard. QMS implementation has put extra workload to staff where a lot of documentation works need to be prepared and managed [29-30]. Documentation is required as evidence in complying the requirements of the standard and be used as a reference in daily task. Organizations have to prepare various level of procedure, operation manual and manage the operational record accordingly. If the procedure or manual do not properly established, it will creates difficulties to the operations, increase work flow and make it more complicated which affect the operation effectiveness and ultimately will reduce customer

satisfaction and increase operational cost [31]. Individual or community preparing the procedure or manual for the organization shall have a capability of doing it as the content of the procedure or manual shall be accurate, correct and be arranged for easy application by the user. Those individuals or community shall have appropriate capability to create quality knowledge before transferred it explicitly in the form of procedures or manuals.

Another problem in QMS maintenance occurs within the organization is related to the quality culture amongst the employee. Chin *et al.* [32] found that problems associated after registration to ISO 9000 are the change in quality culture among employees. This was supported by another researcher, Wahid and Corner [33] which outline that most of the challenges in sustaining QMS are associated with changing people's attitude and behavior towards the QMS. Wahid and Corner [33] also found that another problem faced by the organization related to the employee issue are making employee supportive and fully involved in QMS activity, getting commitment from both staff and management, eliminating the culture of shortcut and not following procedures and improving staff motivation to maintain certificate.

#### ■4.0 GAPS, OPPORTUNITIES AND THE PROPOSED QMS MAINTENANCE FRAMEWORK

Previous researchers, Kanter and Wahid have proposed a framework for ISO9000 maintenance. However, as highlighted in the previous section both Kanter and Wahid did not address the importance of managing processes and its interaction to comply with the requirements of ISO9001 standard. Therefore, we argue that Wahid's framework can be improved by adding elements that focus on the management of the processes and its interaction (the process based management (PBM)) towards fulfilling the technical requirement in the standard. This is based on the fact that the effective management of process and its interaction will lead to effective process control and process execution which will generate valuable output towards fulfilment of customer needs and the compliance of the ISO9000 standard. According to Senge [34], it is important to see the whole organization in terms of the relationships between the interdependent processes and understand these processes. Effective implementation of PBM will ensure full compliance of ISO 9001:2008 standard requirements via various ways. For instance, clause 5.3 and clause 5.4.1 concerning on the strategic direction of the QMS through quality objective, quality policy as well as vision and mission establishment, controlling, monitoring and measuring can be achieved through PBM. PBM which enable organizations to align strategy with the objective, provide effective project and process execution [35] will ensure all objectives, visions and missions of the organization can be achieved through systematic and effective monitoring and measuring. Section 0.2 of ISO9001:2008 Quality Management Systems standard itself has emphasized PBM as an approach to manage and maintain the quality systems in the organization. From the technical aspect, PBM is very important in implementing and maintaining the QMS as ISO 9004:2009 standard stresses that organizational desired result can be achieved more efficiently when activities and related resources are managed as a process.

From another perspective, the QMS maintenance framework should also emphasize on the element which will enable organizations to effectively manage the process and its interaction such as the availability of quality knowledge during the implementation of the QMS. Examining the framework of Wahid further highlighting another gap where her framework did not emphasize quality knowledge as a main resource to expedite both technical and non-technical aspects of work process in maintaining QMS. Without considering quality knowledge as one of the



elements in the framework, Wahid has left behind the fact that knowledge is the most important resources in the organization that is needed in managing the organization [36]. The importance of knowledge intensity in work processes has increased in the past decades [37]. Therefore, organizations need to clearly aware on quality and intensity of their knowledge asset and should be able to leverage it within their operation to gain competitive advantages. Nevertheless, problems associated to human resource in maintaining QMS comes from the lack of understanding of the principles, methodology and strategy associated to the certification of ISO9001:2008. Staff and top management will appreciate and having high level of understanding of the QMS principles, methodology and strategy if they were being provided with sufficient knowledge that meet certain quality criteria which is useful in the context of maintaining QMS. Quality knowledge is also required in the human resource aspect of QMS implementation especially to promote an integrative environment to maintain QMS so that the problem associated with changing people's attitude and behavior towards the QMS, making employee supportive, eliminating the culture of shortcut can be overcome effectively. Nevertheless, previous research rarely focuses on the creation of quality knowledge and the practical side of it, instead focusing on the factors which will enhance the knowledge creation within the organization.

We have reviewed approaches and framework associated to human resource aspect in QMS maintenance framework and found that the creation of quality knowledge within the organization and the establishment of individual competencies through the concept of knowledge self-efficacy amongst staff who directly involve in maintaining the QMS are yet extensively being explored. The level of knowledge self-efficacy amongst employees for QMS maintenance is very important since the capability of individuals to identify, acquire, create, share, preserve and apply knowledge will influence the quantity and quality of knowledge in the organization. Within organization, the success of knowledge creation will be influenced by organizational member knowledge self-efficacy since community behavior towards creating and sharing knowledge will also be influenced by the awareness of the community of their capability in sharing and creating knowledge (based on the knowledge creation theory and organizational learning theory introduced by Nonaka and Takeuchi [38]). To initiate this capability, individual (in this context is the employee of the organization) should have their personal confidence towards behavior in manipulating data and information to become knowledge. Since organizational knowledge is first acquired at the individual level [21, 41], it is very important to understand how individuals should have their own confidence to acquire knowledge and have internal capability to transform the knowledge to become the organizational knowledge through the concept of self-efficacy. In this case, the confidence level of the individual that form the community within the organization will be very important towards the maintenance of QMS, thus justifying the needs to incorporate the knowledge self-efficacy as part of the element in QMS maintenance and fit very well to improve the current framework. However, from thorough review of previous literature, none of the previous and current research has touched on the knowledge self-efficacy towards the creation and sharing of quality knowledge, towards the effective process management and towards the success of QMS maintenance. This is supported by Boiral [6] who found that previous studies on ISO 9000 have not focused at micro level, i.e. the employees who deal with the ISO9000 systems on a daily basis.

We believe that the review of existing QMS maintenance framework is timely appropriate and shed light for future research which will become the significant knowledge contribution in this area. This paper proposes integrated multidisciplinary elements

within the QMS maintenance framework as to provide suitable solution on the limitation of the current frameworks and then uses it as a theoretical lens to examine an organization's journey towards maintaining QMS. Adding process based management (PBM) effectiveness, quality knowledge and knowledge self-efficacy elements will enhance the current QMS maintenance framework. We suggest that an empirical research to be conducted to examine the causal effect of PBM effectiveness, knowledge quality and knowledge self-efficacy to QMS maintenance as to support the literature exploration made in this article. We also suggest that the future empirical studies on this particular area can be supported by the underpinning theory for Knowledge Creation Theory (Nonaka and Takeuchi, 1994), Social Cognitive Theory (Bandura, 2001) [39], Self-efficacy theory (Bandura, 1978) [40], the process management principles (Jeston and Nelis, 2008) [35] and the principles for QMS maintenance (Kanter, 1984) [8].

## 5.0 CONCLUSION

This paper has constructively explored all relevance literature derived from previous research in the field of knowledge management, quality management systems as well as the process based management in reviewing the QMS maintenance framework. This paper had also explained the limitation of the current available QMS maintenance framework and revealed the gaps and opportunities left by previous researcher. The paper ends with a proposal of new potential elements to be embedded in the current existing QMS maintenance framework. By having the reviews, a significant contribution in academic and the practical context of QMS area are made. Upon completion of the empirical study as suggested, the new QMS maintenance framework hopefully will be more comprehensive and meaningful to the organizations since the most essential element i.e. knowledge resources are be linked and considered as part of the important elements in maintaining QMS. Without a strategy that link knowledge resources to QMS maintenance initiatives, the time, effort and money devoted by the organization towards QMS sustainability may be wasted.

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