

MS ISO 9001 certification: does it effective and beneficial to MARDI

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ABSTRACT: A study was conducted to identify the impact of Quality Management System (QMS) implementation and MS ISO 9001 certification in MARDI. The respondents were among MS ISO 9001 team members. There were two phases involved in data collection process. In the first phase, the respondents were provided with feedback on the number of Non-Conformance-Report (NCR) and Opportunity-For-Improvement (OFI), which they acquired during internal audits. Volume trends from the year 2010–2014 were discussed. The results showed that the respondents agreed the periodically audit system helped them to improve the implementation of quality in the course of work. The same quality of work after the MS ISO 9001 certification makes monitoring and supervisory system works more systematically. The second phase examined the perception of team members on the effectiveness of QMS implementation. It covered four perspective parts namely: i) the learning and career growth; ii) the operating system; iii) the customer management; and iv) the financial system. The result showed that the respondents' agreement levels on QMS are between 78–86%. These results indicate they agreed that the implementation of the QMS is effective and achieves satisfactory level. A continuous improvement is essential to be done if we want to make sure the product or services are in accordance with the standards of quality. Any constraints faced by implementers need to be addressed by the top management accordingly if they want to achieve success in the QMS implementation.

Keywords: MS ISO 9001, impact study, quality management system, effectiveness, benefits

I. INTRODUCTION

The Quality Management System (QMS) is a system that focuses on continuous improvement, efficiency, and effectiveness of an organisation's operations. It is the system that an organisation uses to manage the quality of their services or products. A QMS consists of various elements. ISO 9001 groups them into four categories: the first one is management. It includes matters on how to manage the organisation by planning, setting goals and objectives, and reviewing progress. The second category is the resources. The organisations have to make sure people are competent for their work and the right equipment is available. The third category is services or products 'realisation'—whatever is involved in creating or delivering them. The last category involves activities of monitoring, measuring, and checking any failures or problems systematically and fixing them [1]. The implementation of QMS requires commitment and support from the top management. Hence to ensure its success, the top management are responsible to formulate policy and quality objectives of the organisation, as well as to ensure that all members of the organisation understand and committed to the direction of the organisation.

ISO 9001 certification is a testament to the hard work of the organisation in implementing and maintaining the QMS. ISO 9001 is a set of written standards, which describes the elements of the basic requirements that must be included in the QMS to ensure the services provided by an organisation meet customers' needs. The implementation of QMS is expected to benefit organisations that practice it as it optimises human resources, product, service quality, financial performance, and organisational operation. However, its effectiveness must be measured because by only practicing QMS and maintaining ISO 9001 certification is not sufficient [2]. A research by Psomas et al. [3] on the effectiveness of the QMS was carried out at a number of service companies that obtain ISO 9001 certification in Greece. The results showed that not all companies were benefited from the certification, particularly in the aspect of financial management. This can be attributed to inefficiencies in the implementation of QMS. Therefore, what should be emphasised in the

practice of an organisation is not only on how to get the ISO 9001 certification, but also the implementation of an effective QMS after gaining the certification.

1.1. MS ISO 9001

'MS' is an acronym for Malaysian Standards, while the 'ISO' comes from the Greek word 'ISOS' means 'the same'. It is a non-governmental organisation named as International Organisation of Standardisation headquartered in Geneva, Switzerland. The number '9001' represents the number during the registration of standard for quality management made in 1987. There are three main standards. For the latest edition, ISO 9000 is the basis and contains the vocabulary that describes the terms and terminologies in the implementation of the QMS. ISO 9001 contains requirements for audit and certification purposes. Whereas, ISO 9004 contains guidelines for the implementation of a more efficient and effective QMS, aimed at improving the performance of organisations.

To ensure the standard is always up-to-date, it is reviewed every five years to determine whether it should be retained, amended or cancelled. Up to now, MS ISO 9001 uses a fourth edition. The first edition was in 1987 and written as "MS ISO 9001: 1987". In 1994, the standard was revised and the second edition, MS ISO 9001: 1994, was produced. The third edition of MS ISO 9001: 2000 was used after the second edition version had been cancelled. In accordance with the standard production of ISO 9001: 2008 and MS ISO 9001: 2008, all certifications based on MS ISO 9001: 2000 certification were terminated [4].

1.2. The Implementation of MS ISO 9001 in Public Service

The government decided that the MS ISO 9000 is compulsory to be implemented in all agencies as stated in the *Pekeliling Kemajuan Pentadbiran Awam (PKPA) No. 2, 1996*, entitled "*Garis Panduan Bagi Melaksanakan MS ISO 9000 Dalam Perkhidmatan Awam*", dated July 11, 1996. At that time, the implementation of the MS ISO 9000 certification was based on one of the MS ISO 9001, MS ISO 9002 or MS ISO 9003 versions 1994 [5].

In the context of the public service, the goal of producing a quality system that is efficient and effective should be the driving force for government agencies to implement MS ISO 9001. The implementation will enable government agencies to create a QMS that has principles and features, such as: i) to prevent and not only solve the problem after it occurs; ii) to do continual review of critical processes and take corrective actions; iii) to create a consistent way to work and meet the principle of right the first time and every time; iv) to ensure all work is based on the documented policies and procedures; and v) to pay attention to the quality of record-keeping for the implemented actions.

The QMS that was established based on the aforementioned principles and characteristics can further enhance the ability of a management to make decisions accordingly, control the inputs used in the process, control the cost of the repetitive work and of poor quality, avoid wastage, and improve productivity [5]. The Department of Standards Malaysia [6] has outlined the benefits of MS ISO 9001: 2008 certification for an organisation or company.

The implementation of QMS helps organisations to better manage their businesses to meet customers' requirements. This will result in better products, better customer service, satisfied customer, and repeating orders. With proper implementation, businesses become more efficient and productive. Subsequently, it reduces errors, rework, operation cost, time, and use of resources. The QMS promotes continual improvement, which provides business with the competitive edge to compete in the market. For those who have succeeded, they can become more successful and resilient. The QMS also looks into the needs of human resource, which increase staffs' morale and commitment. Complying with the standards provides the organisation with the accolades for competitive edge and increasing profitability.

1.3. MS ISO 9001 certification in MARDI

As an organisation of research and development (R&D), MARDI should be managed in an efficient and systematic manner. MARDI focuses on MS ISO 9001 activities as one of its main agendas since 1998 to improve and strengthen the QMS. Through the implementation of QMS, MARDI's performance can be measured by taking into account the needs of customers and stakeholders. MARDI was awarded the MS ISO 9001: 1994 in 1998. This certificate was upgraded to MS ISO 9001: 2000 in 2004. In 2011, the use of QMS in

MARDI was again upgraded to MS ISO 9001: 2008. Up to year 2015, there are 11 main processes and 21 support processes accredited with MS ISO 9001 certification [7].

By being accredited with MS ISO 9001, MARDI is recognised as a high-quality organisation with international standards and its products or services are accepted and internationally guaranteed. Besides that, MARDI is also qualified to participate in *Anugerah Kualiti Perdana Menteri* (AKPM), which is a formal recognition to the government agencies that has demonstrated a deep understanding of management and quality improvement. MARDI was awarded AKPM twice, which was in 1992 and 2005. MARDI's products and services are accepted and internationally guaranteed. Nevertheless, among the weaknesses in implementing MS ISO 9001 are the commitment issues from the top management and staffs, inadequate exposure to MS ISO 9001, and less recognition to the implementers from the top management in terms of incentive and reward.

MARDI will review the objectives and quality policy in the *Mesyuarat Kajian Semula Pengurusan* (MKSP) each year, to ensure continued compliance documentation. After more than 17 years of implementing QMS, which involved sum amount of workforce allocation, the impacts of the implementation need to be evaluated. It is important to ensure the effectiveness is well spread among workers. Therefore, an impact study was conducted to measure the effectiveness of the QMS practices and MS ISO 9001 certification. This study also identifies its benefits to MARDI.

II. METHODOLOGY

2.1. Model studies

The implementation of the QMS practices and MS ISO 9001 certification is considered successful if the effectiveness and benefits can be assessed. The effectiveness was evaluated in terms of how non-conformity-process MS ISO 9001 is prevented. The executors' perception should also be evaluated. Their views as internal customers can be a benchmark for the effectiveness of the implementation. When the implementation of the QMS is effective, the organisation will certainly gain benefit from it. The benefits can be accessed through the four perspectives (4P), which are:

1. Perspective of Learning and Career Growth,
2. Perspective of Operating System,
3. Perspective of Customer Management
4. Perspective of Financial System (Fig. 1).

Although the organisation has implemented a QMS effectively and benefit from it, each process should be adjusted based on the vision of the organisation. This coordination is intended to ensure that the organisation is on track. The internal and external communication of an organisation can be improved when the coordination is identified because the organisation performance against goals is monitored [8]. In order to coordinate the processes at MARDI, a Vision and Strategy Model was constructed based on a literature survey on the Balanced Scorecard model by Dr. Robert Kaplan and David Norton (Fig. 2). The process is divided into four sections based on the 4P. Each perspective should answer the key question for achieving the perspective's vision and strategy [8].

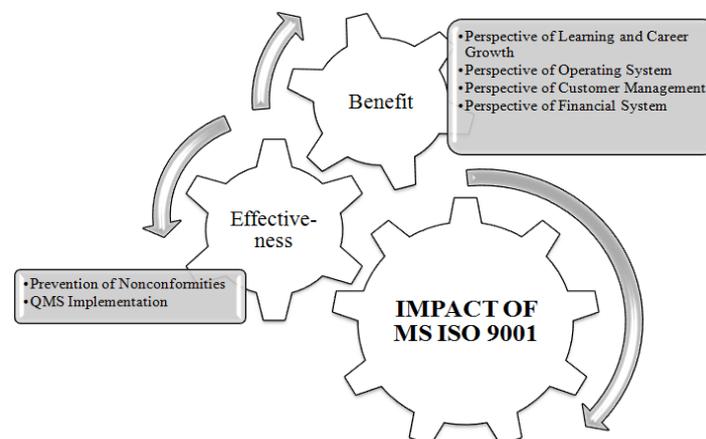


Figure 1. Model theory framework

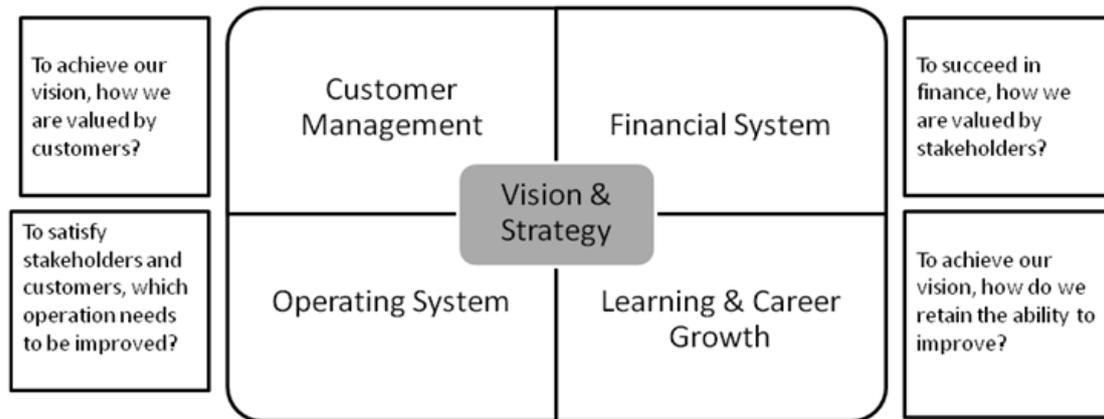


Figure 2. Vision and strategy model

2.2. Data sources and sampling

Data was collected through two phases. The first phase is the collection of information from existing records, MKSP Report and the Annual Report on Internal Audit MARDI. The information collected is the number of NCR (non-conformance-report) and the number of OFI (opportunities-for-improvement) for each process, which gets the MS ISO 9001: 2008 in MARDI. The information was gathered from year 2010 to 2014.

The second phase is the collection of information from team members. Respondents who participated in this survey were the process owner, deputies, and three members of the team. The stratified sampling method was used. The collected information included:

- The level of agreement on the effective implementation of the QMS; and
- Perceptions on the benefits of MS ISO 9001 implementation based on the 4P.

The respondents were asked to rate given statements using a scale of 1 to 6, with 1 represents strongly disagree and 6 represents strongly agree.

2.3. Data analysis

Analysis per cent and agreement index (AI) was carried out using Microsoft Excel. The calculation of percentage is as follows:

$$\frac{\sum(\text{Number of option} \times \text{weight})}{\text{Number of respondents} \times 6} \times 100\% = \text{Agreement percentage: AI value}$$

Weight is a value of 1–6, in which 1 stands for strongly disagree and 6 stands for strongly agree.

Agreement index used in this study was adapted from Key Performance Indicator (KPI) table (2012) adopted in internal customer satisfaction survey in MARDI (Table 1).

Table 1. Measurement Scale Index

AI value	Percent Agreement
NS - not surpasses satisfaction	<68%
RS - reached satisfaction	68–75%
AS - achieve satisfaction	76–89%
VS - very satisfied	≥90%

Source. [9].

III. RESULTS AND DISCUSSION

3.1. Profile of respondents

The study gathered information from a Quality Manual process, seven out of the 11 main processes (64%), and 52% (12 out of 21) of the support processes (Fig. 3).

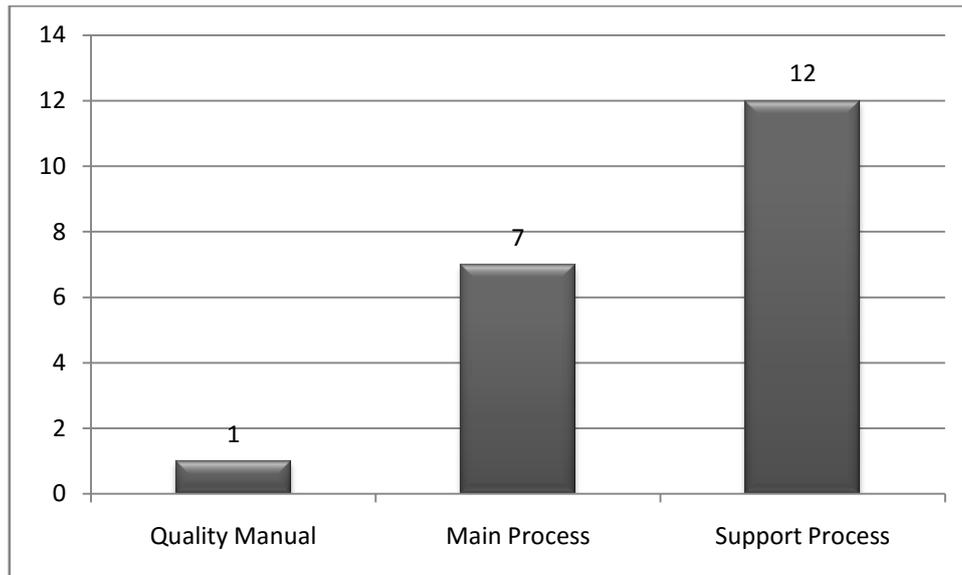


Figure 3. The number of respondents

A total of 17 out of the 20 process owner gave feedback, followed by 16 process deputy and 47 team members (Fig. 4).

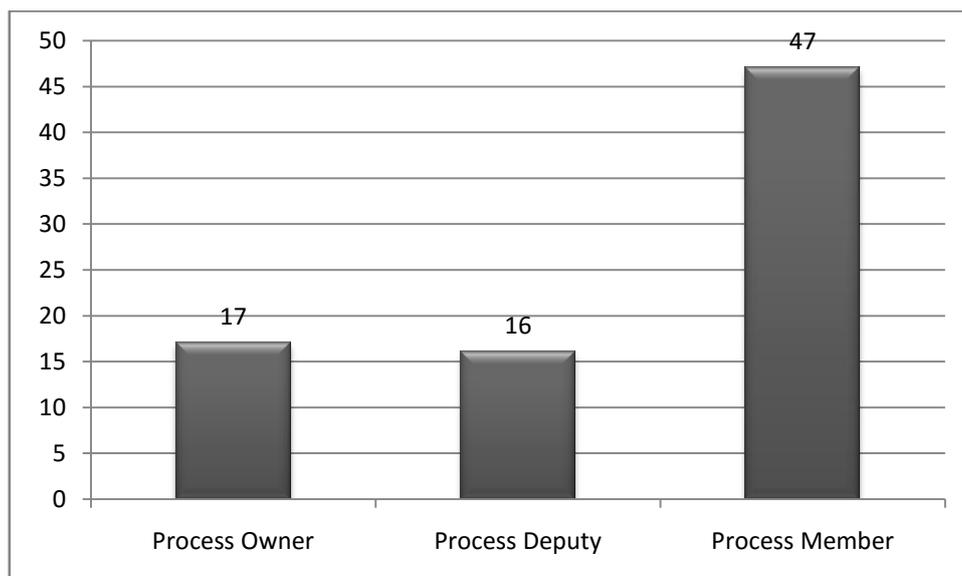


Figure 4. Number of respondents by position in the process

3.2. Effective implementation of QMS in MARDI

The effectiveness of the QMS practice was examined from two aspects. The first aspect is the effectiveness of the prevention of non-conformity (NCR and OFI) and the second aspect is the percentage of effectiveness agreed by individuals who carry out the QMS.

3.2.1. QMS effectiveness: the prevention of nonconformities.

Fig. 5 shows the trend of NCR and OFI obtained from the annual report of the Internal Audit (2010 to 2014). The number of NCR and OFI for Quality Manual (Manual; written in the graph), the Main Process (Main) and Support Process (Support) were analysed. The graph shows increasing and decreasing trends of NCR and OFI. The frequency of OFI is more than NCR. This shows most of the processes were well documented and only needed to be improved on the working procedures. Numbers of OFI proves that internal

auditors emphasised on improvement and constantly monitor activities that can be improved. The graph shows a declining trend from 2012 to 2014 for the two categories of process.

The process owner and deputy gave some opinions on the graph trends. It aims to determine the level of their understanding of the internal auditing. Overall, all respondents viewed that the trends of OFI and NCR depend mostly on the auditor. Some respondents agreed the frequency of NCR and OFI depends on the knowledge and experience of the auditor. Auditors were more sensitive and had a thorough understanding of the process and procedures, and they were doing their duties with more dedication. A deep understanding, exposure, and experience of team members during auditing also have an important role.

In 2011, MARDI upgraded the MS ISO 9001: 2000 to MS ISO 9001: 2008. This process affected auditors and auditee, in which it can be viewed from an upward trend depicted from 2010–2011. This was due to the changes in documentation and the implementation was still less effective. Decreasing trend is depicted from 2012–2014 and this proves the team members already followed the implemented procedures.

Overall, the internal audit has a positive impact on the monitoring process. This is evidenced by very high correlation values (0.97 for main process and quality manual, 0.99 for support process) between the items: i) MS ISO 9001: 2008 makes monitoring/supervision of the system work more systematic; and ii) Periodic audit systems help improve the implementation of QMS in the course of work. The results are shown in Table 2.

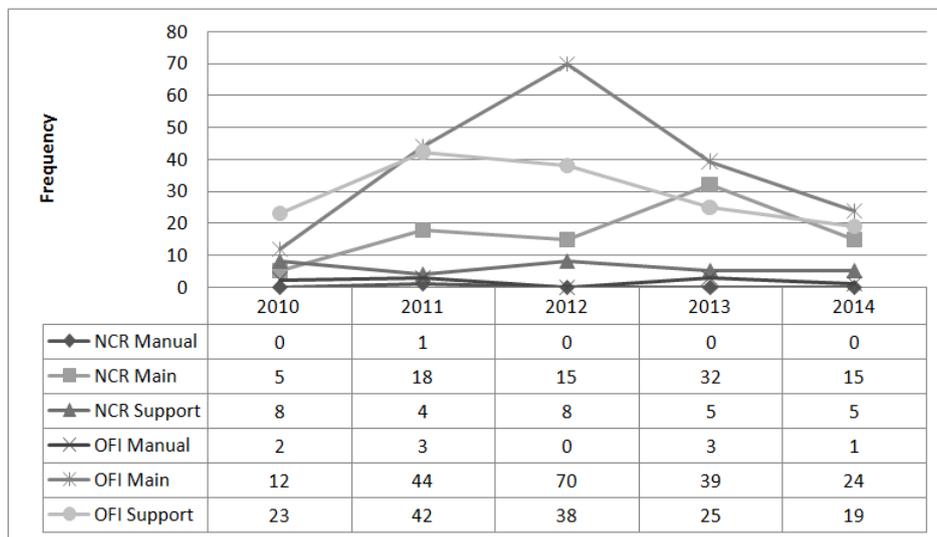


Figure 5. NCR and OFI volume trends (2010–2014)

Table 2. Respondents’ feedback on the effectiveness of the audit system/monitoring

Internal audit / Monitoring	Main Process and Quality Manual	Support Process
	Percentage (AI)	Percentage (AI)
MS ISO 9001: 2008 makes monitoring/supervision of the system work more systematic.	86 (AS)	81 (AS)
Periodic audit systems help improve the implementation of QMS in the course of work.	85 (AS)	81 (AS)
Correlation value	0.97	0.99

3.2.2. QMS effectiveness: the implementers’ perception.

Team members were asked to give their perceptions on the effectiveness of the QMS implementation. The team members were chosen as the respondents because they were expected to know better whether or not their performance is efficient, effective, and productive. They also can make a better comparison over time. Respondents were divided into two groups, the main process (including Quality Manual) and support process. There are four perspectives that were studied, namely learning and career growth, operating systems, customer management, and financial systems.

Respondents from the main process agreed that the most effective part is management with customers (86%), followed by the financial system (84%), and the operating system (83%). The learning and career growth aspect received the lowest approval percentage (78%). All of the IP values are measured as 'achieved satisfaction' (AS) (Table 1). These results indicate that the respondents agreed that the implementation of QMS in all parts of the MARDI management is effective. The results on the respondents' agreement level on QMS practice do not show any significant difference (Table 3). On average, the percentage of main process group (83%) is higher than support process (81%). All aspects of QMS practice obtain IP values that are measured as AS. These means all implementers agreed that the implementation of the QMS in MARDI is effective and achieves satisfaction.

Table 3. Respondents' Agreement Level on QMS Practice

<i>Perspectives</i>	<i>Main Process</i>	<i>Support Process</i>	<i>T-test</i>	
	<i>Percentage (AI)</i>	<i>Percentage (AI)</i>	<i>T-value</i>	<i>Sig.</i>
Overall	83 (AS)	81 (AS)	0.483	0.631
Learning and Career Growth	78 (AS)	78 (AS)	-0.043	0.966
Operating System	83 (AS)	81 (AS)	1.335	0.186
Customer Management	86 (AS)	81 (AS)	0.105	0.917
Financial System	84 (AS)	80 (AS)	1.639	0.105

3.3. Benefits of MS ISO 9001 Implementation

Literature research shows the implementation of QMS and MS ISO 9001 certification provides many benefits to organisations that practice it effectively. This study looks at the benefits obtained by MARDI through four perspectives, namely:

- i. Perspective of Learning and Career Growth,
- ii. Perspective of Operating System,
- iii. Perspective of Customer Management, and
- iv. Perspective of Financial System.

The respondents' perceptions on MS ISO 9001 certification are measured as AS, with the range of between 77–86% (Tables 4 and 5). Results of comparison test show no significant difference between the main and support processes. This means the team members' perceptions from both groups are of similar percentages.

Overall, MS ISO 9001 certification makes the implementation of QMS in MARDI more consistent. Respondents agreed that the implementation of QMS enhances their quality of work and makes them more productive. In addition, it also makes communication and access to information in MARDI easier and faster.

Table 4. Perception of MS ISO 9001 certification and QMS implementation as a whole

		<i>Main Process</i>	<i>Support Process</i>	<i>T-test</i>	
		<i>Percentage (AI)</i>	<i>Percentage (AI)</i>	<i>T-value</i>	<i>Sig.</i>
1	MS ISO 9001 certification in MARDI makes the implementation of QMS more consistent.	85 (AS)	82 (AS)	1.287	0.202
2	QMS implementation makes communication and access to information in MARDI easier and faster.	77 (AS)	79 (AS)	-0.645	0.521
3	QMS implementation makes the quality of work in MARDI more productive (efficient).	82 (AS)	83 (AS)	-0.059	0.953

Table 5. Perceptions of MS ISO 9001 certification and QMS implementation in accordance with four perspectives

		<i>Main Process</i>	<i>Support Process</i>	<i>T-test</i>	
		<i>Percentage (AI)</i>	<i>Percentage (AI)</i>	<i>T-value</i>	<i>Sig.</i>
<i>Perspective of Learning and Career Growth</i>					
1	MS ISO 9001 certification makes continuous training system can be implemented.	83 (AS)	82 (AS)	-0.399	0.691
2	QMS implementation facilitates the training of workers	81 (AS)	78 (AS)	0.572	0.569

3	MS ISO 9001 certification increases the confidence of workers to get training organised by MARDI.	78 (AS)	76 (AS)	-0.046	0.964
4	Each employee gets the opportunity for career development through the implementation of QMS.	76 (AS)	74 (RS)	-0.370	0.712
5	QMS implementation causes the skills and expertise of each employee can be monitored more effectively.	82 (AS)	81 (AS)	0.126	0.900
<i>Perspective of Operating System</i>					
1	MS ISO 9001 certification makes the work more systematic.	90 (VS)	85 (AS)	1.913	0.059*
2	The work carried out will be more effective and organized when there is QMS in MARDI.	86 (AS)	83 (AS)	0.883	0.380
3	Tasks can be executed in a timely manner in accordance with MS ISO 9001 documentation.	86 (AS)	81 (AS)	1.507	0.136
4	Employee satisfaction can be monitored with the implementation of the QMS.	73 (RS)	74 (RS)	-0.457	0.649
5	The principle of 'right first time and every time' can be done much more efficiently when there is MS ISO 9001 certification.	86 (AS)	80 (AS)	1.847	0.069*
<i>Perspective of Customer Management</i>					
1	MS ISO 9001 certification has enhanced customers' confidence.	87 (AS)	84 (AS)	-0.764	0.447
2	Customer satisfaction can be identified by the systematic implementation of the QMS.	84 (AS)	81 (AS)	0.751	0.455
3	MS ISO 9001 certification ensures long customer loyalty and new customer acquisition.	85 (AS)	77 (AS)	1.955	0.054*
4	Implementation of the QMS ensures the high quality of services/products.	88 (AS)	79 (AS)	1.731	0.087*
5	Customer requirements are more easily identified with the implementation of the QMS.	89 (AS)	81 (AS)	1.993	0.050*
<i>Perspective of Financial System</i>					
1	MS ISO 9001 certification makes financial management more systematic.	90 (VS)	85 (AS)	1.450	0.151
2	Financial funds can be used optimally with the implementation of the QMS.	84 (AS)	79 (AS)	1.577	0.119
3	MS ISO 9001 certification improves the MARDI's credibility to get public funds.	84 (AS)	76 (AS)	2.058	0.043**
4	Spending is more efficient by the implementation of the QMS.	82 (AS)	81 (AS)	1.382	0.171
5	Productivity (services/products) is better with the implementation of MS ISO 9001: 2008.	87 (AS)	84 (AS)	1.127	0.263
6	MS ISO 9001 certification allows MARDI to prioritise the distribution of financial allocations.	77 (AS)	83 (AS)	0.654	0.515

* significant at 10% level of significance

** significant at 5% level of significance

3.4. Model Vision and Strategy

Fig. 6 shows the perspective model for the study. For each perspective, the study identifies the achieved percentage, the objectives to be achieved, the constraints encountered, and the strategies to be implemented. Based on the achieved percentage, all perspectives are measured as AS. The results show the

highest percentage is the perspective of customer management (83%), followed by the financial system (82%), and the operating system (82%). The lowest percentage is learning and career growth perspective (78%).

To achieve its vision of becoming a renowned R&D organisation, the management must know how MARDI is valued by the customers. It aims to meet their expectations and obtain their trust in dealing with MARDI. The results show that MS ISO 9001 certification has increased customers' confidence. Certification can also ensure the loyalty of existing customers and acquire new customers. To ensure that these benefits are achieved, the MARDI management has to perform several important objectives related to customer management. The objectives are to satisfy the customer, to give useful advice, and to meet their expectations. The results show the latest achievement for customer management aspect is 83%. A constraint faced is the difficulty to meet the requirements of each customer. There are several strategies identified to overcome this constraint. The strategy is to identify customers' needs and ensure they understand the objectives and mission of the MS ISO 9001, which is held in MARDI.

Although MARDI is not a financial-generated institution, but financial aspect is critical in conducting research and commercialisation. To ensure that funding can be obtained and used optimally, the management needs to earn the trust of stakeholders to provide funds. The results show MS ISO 9001 certification has enhanced the credibility of MARDI in getting public funds. Although MARDI has MS ISO 9001 certification for more than 15 years, but it still faces with the constraint of not getting enough allocation as requested. The latest achievement for financial system aspect is 82%. How to overcome this constraint? Several strategies have been identified, namely: i) make early action each year for the approval of the budget; and ii) make budgeting system, which meets the requirements of stakeholders.

MARDI's achievement from the perspective of the operating system is 82%. This percentage is due to several constraints that still need to be addressed, namely the lack of workers experience in implementing the QMS. The infrastructure is still incomplete and not up-to-date. To ensure the quality of products/services is in accordance with the standards of quality and to ensure efficient production, the management should identify the MS ISO 9001 that still needs to be improved and upgraded. The strategies identified are monitoring every process run. Existing procedures must be implemented with the principle of 'right first time and every time'. In order to optimise the benefits derived by the MS ISO 9001 certification, the management should review its existing infrastructure and ensure more modern equipment is available.

There is a question of how MARDI wants to retain the ability to improve the process. The main asset that the management should highlight is the need to enhance the credibility of the internal customers, i.e. employees. Some of the objectives of learning and career growth are to produce employees with effective communication and able to cooperate effectively to implement the QMS. All employees who implement the QMS must properly understand the scope and function of their work. The latest achievement of learning and career growth aspect is 78%. One of the constraints faced by them is inadequate course on MS ISO 9001. Besides, the team members are often exchange, causing the procedure to be improperly executed. This is due to team members' lack of experience and knowledge. The identified strategy to cope with the constraints is conducting skills training periodically for each member of the team who are implementing the QMS. Besides, increasing awareness on the importance of QMS should also be done to ensure that the team members respect their work. The learning process should be carried out regularly and skills of every employee need to be monitored with more effective methods.

IV. CONCLUSIONS AND RECOMMENDATIONS

Overall, the effectiveness of the QMS implementation in MARDI is at the intermediate level and it achieves the team members' satisfaction. The customer management perspective shows the highest effectiveness, followed by the operating system, and financial system perspectives. The effectiveness of QMS implementation from the perspective of learning and career growth appears the lowest and it still needs a lot of improvement. The owner and deputy process viewed auditing activities represent a systematic monitoring system work and help improve procedures implemented. The quality of work becomes more productive and efficient. MS ISO 9001 team members must be aware that a continuous improvement is essential in the successful implementation of QMS. MS ISO 9001 certification improves customer confidence when dealing with MARDI. But most of them still feel quite onerous with documentation activities. They feel documentation

as an additional burden of work and there is not enough staff. Lack of funds to implement procedures properly is also a problem that is quite critical and appropriate actions should be taken by the top management of MARDI. Among the proposals that need to be taken seriously by the senior management of MARDI are:

- i. Conduct appropriate courses and trainings to the auditor
- ii. Give adequate exposure to the team members
- iii. Ensure continuous improvement is carried out periodically
- iv. Conduct periodic training to team members on the implementation of MS ISO 9001
- v. Give recognition to each member of the team MS ISO 9001 to the task
- vi. Give awareness courses on the importance of QMS
- vii. Increase the number of workers for each process that is in need
- viii. Conduct employee satisfaction surveys regularly
- ix. Conducts customer satisfaction research and study customers' needs
- x. Ensure the funds needed by each process are adequate

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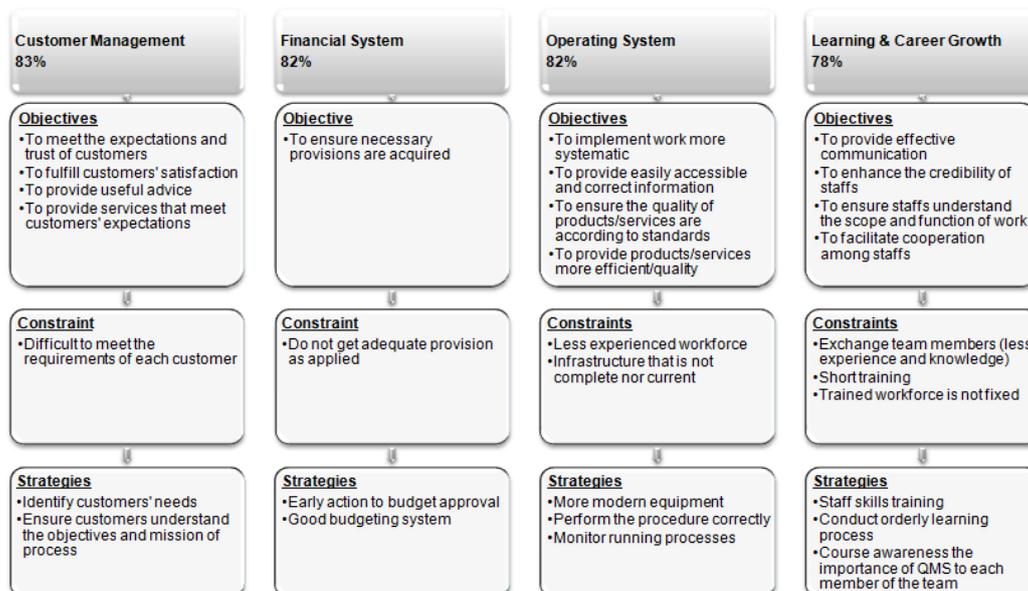


Figure 6. Vision and strategy model for the implementation of MS ISO 9001 in MARDI