Doctoral Dissertation

Quality Initiatives (QIs) Institutionalization in Malaysia: Comparative Study between Japanese and Malaysian Manufacturing Companies

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Abstract

It is apparent nowadays for manufacturing companies that quality is part of business basic norms and requirements in this competitive globalized environment. Therefore, for decades, manufacturing companies have searched for ways to improve the quality of their products and services. Quality initiatives (QIs) that focus on continuous processes and product improvement turn out to be one of the solutions, and thus it is considered as one of the important practices to boost manufacturing performance and competitive edge. Consequently, QIs implementation, particularly in total quality management (TQM), International Organization for Standardization (ISO) 9001, Kaizen, lean manufacturing, and Six Sigma, has become a prerequisite for manufacturing companies to meet global demands.

There is an increasing debate with the notion that organizations' motivation in implementing certain practices is due to rational strategies and efficiency factors. In contrast, institutional theory advocates the view that organizations' sustainability depends both on technical and symbolic aspects such as market and social legitimacy. There are a substantial number of articles discussing QIs implementation from the lens of technical logic and efficiency. QIs studies from a symbolic standpoint are extremely rare. Thus, the institutional theory approach was selected to further examine the QIs implementation in order to have a better understanding of QIs implementation from a different point of view, focusing on the mechanism of institutional pressures imposed in the manufacturing environment in Malaysia.

A preliminary literature review was conducted to identify the research gaps, hence narrow down the research questions. A critical review related to institutional theory findings in the manufacturing industry was conducted to grasp the overview idea. There are three research gaps identified from the review. The gaps are related to QIs convergence and divergence practices, QIs institutionalization, and QIs dissemination. Therefore, this research aims to examine the three gaps mentioned at the Japanese and Malaysian manufacturing companies in Malaysia from the organizational (sociological) institutionalism perspective. In accordance with the research objectives and research questions, a qualitative study that utilized a case study approach was deemed appropriate. A research protocol based on summarized TQM elements was established to guide the interview session and direct observation. 14 case studies were conducted on Malaysian manufacturing companies. All the companies were ISO 9001 certified within the three main sectors (plastic-based, machinery and equipment-based, and chemical-based companies), covered

the various categories of company size (large-sized, medium-sized, or small-sized companies), and actively operate in several regions in Malaysia. The case study results were coded and analyzed with Atlas.ti version 8.4.25 software.

Based on the two different focus groups (Japanese and Malaysian companies), the outcomes demonstrated that manufacturing companies implemented numerous quality initiatives (e.g., ISO 9001, Kaizen, lean manufacturing, and Six Sigma), especially in supporting the effectiveness of every production process toward producing high quality products. The important factors and their effects on QIs implementation were identified. The findings emphasized the important role of the top management. Top management should demonstrate their commitment by providing moral and physical support. Furthermore, QIs entrepreneurs' competence and formal structure are required to drive and sustain QIs implementation. In addition, this research described the reasons for convergences and divergences in practices based on those 14 case studies.

The degree of institutionalization of companies was assessed based on five factors, which were model, culture, education, regulative, and technical-rational. The Japanese manufacturing companies revealed a higher degree of QIs institutionalization as compared to Malaysian manufacturing companies, especially in regulative and technical-rational factors. As for the dissemination of QIs in Malaysia, it was found that eight actors (four primary actors and four secondary actors) had significant influence on the manufacturing industry in Malaysia. Similarities exist between the Japanese and Malaysian manufacturing companies, whereby top management, internal trainers, and customers play significant roles. However, the Japanese manufacturing companies gained further benefits due to strong support from the headquarters.

At the national level, it was found that the "Look East Policy" served as the impetus that stimulated QI implementation in Malaysia. Even though Malaysian government agencies received assistance from various countries, it was found that Japan has a great influence in disseminating the knowledge of QIs via various programs and partnerships. However, Malaysian companies are still having difficulties formulating the QIs implementation, cognitively recognizing the benefits, and entrenching the improvement culture. However, from observations, the idea of quality is becoming a norm for Malaysians because most companies and government agencies are implementing certain QIs to demonstrate that they are capable of meeting basic standard requirements.

From the findings, a diagram of QIs institutionalization logic was generated based on the six propositions. The propositions suggest that the level of QIs implementation is closely related to the nature of customer business and the origin of the driving force. In order to ensure smooth sailing of QI institutionalization, companies need to put extra effort into garnering top management commitment, competent QI entrepreneurs, formal structure, and embedding employees' quality mindset.

The present study contributed to the understanding of QIs implementation by identifying the important practices and points of convergence and divergence between Japanese and Malaysian companies. Recognizing the important practices of QIs implementation and its benefits is essential for practitioners to obtain the overall picture. Practitioners are able to learn from the detailed reviews of QIs implementation, able to gather rough ideas beforehand, and thus prioritize the identified important practices. Besides, investigating the factors contributing to the failure of QIs and how to prevent it is an interesting research area that attracts managers and practitioners' attention.

The originality and value of this research stem from the effort to identify the dynamics of QI research in the manufacturing industry, comprehend current QI implementation, and understand how QIs are disseminated and institutionalized in a developing country from the perspective of institutional theory. As for the theoretical contribution, it was found that the two factors, the complexity of the customer's business and motivation, are essential in determining the expected level of the QIs implementation. These two factors were rarely considered by the previous researchers. Thus, the findings uncovered the reasons that may contribute to the previous research equivocal findings about the effect of various contexts, which brings new insight to the new factors effecting the QIs implementation. In addition to that, an assessment method to assess the level of QIs institutionalization was utilized, hence improvising, and enriching the study conducted by Zeitz et al. (1999) and Gonzalez (2011). Furthermore, the QIs institutional logics diagram improvises and further explains Dubey et al. (2018) findings by relating the logics with real practices for better understanding.

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List of Abbreviations

4M	Man, Material, Method and Machine
8D	Eight Disciplines of Problem Solving
API	American Petroleum Institute
APQP	Advanced product quality planning
AS	Aerospace Standard
ASME	American Society of Mechanical Engineers
ASQ	American Society for Quality
ASTM	American Society for Testing Materials
BB	Black Belt
BCP	Business Continuation Plan
BOD	Board of Directors
BPR	Business Process Reengineering
CATIA	Computer Aided Three-Dimensional Interactive Application
CEO	Chief Executive Officer
CMM	Coordinate Measuring Machine
COO	Chief Operating Officer
Cpk	Process Capability Index
CS	Cultivation System
CSFs	Critical Success Factors
CSR	Corporate Social Responsibility
CWQC	Company-wide Quality Control
DCN	Document Change Notification
DMAIC	Define, Measure, Analyze, Improve, and Control
DOSH	Department of Occupational Safety and Health
DPMO	Defects per million opportunities
ED	Executive Director
EIIP	Enterprise Innovation Intervention Program
EMS	Environmental Management System
ESS	Employee's Suggestion Scheme
FIA	First Article Report
FMEA	Failure Mode and Effect Analysis
GATE	Group Activity Towards Excellence
GB	Green Belt
GM	General Manager
GPRC	Global Procurement Research Centre
HACCP	Hazard Analysis and Critical Control Point
HOD	Head of Department
HQ	Headquarters
HR	Human Resource

HRD Corp	Human Resource Development Corporation
IPAG	In-Process Abnormality Group
ISO	International Organization for Standardization
IT	Information Technology
JIT	Just-in-time
KPI	Key Performance Indicator
LCD	Liquid-crystal Display
LD	Late Delivery
LEP	Look East Policy
M&E	Machinery and Equipment
MBB	Master Black Belt
MD	Managing Director
MEDAC	Ministry of Entrepreneur Development and Cooperatives
MIDA	Malaysian Investment Development Authority
MITI	Ministry of International Trade and Industry
MNC	Multinational Company
MOE	Ministry of Education Malaysia
MOHE	Ministry of Higher Education Malaysia
MOHR	Ministry of Human Resource
MPC	Malaysia Productivity Corporation
MPO	Manufacturing Process Optimization
MSA	Measurement System Analysis
MTIB	Malaysian Timber Industry Board
MTP	Mid Term Plan
NDT	Non-destructive Testing
NG	Not Good
NPI	New Product Introduction
OEE	Continuous improvement department
OHSAS	Occupational Health and Safety Assessment Series
OJT	On Job Training
OT	Overtime
PIC	Person In Charge
PO	Purchase Order
PPAP	Production Part Approval Process
QA	Quality Assurance
QC	Quality Control
QCC	Quality Control Circle
QIA	Quality Improvement Activity
QIs	Quality initiatives
QMR	Quality Management Representative
QMS	Quality Management Systems

QR	Quick Response
QRQC	Quick Response Quality Control
R&D	Research and Development
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals
RFID	Radio-Frequency Identification
ROG	Return of Goods
RoHS	Restriction of Hazardous Substances
RQ	Research Question
SAMM	Skim Akreditasi Makmal Malaysia
SCAR	Supplier Correction Action Request
SGA	Small Group Activity
SHE	Safety, Health and Environment
SIRIM	Standards & Industrial Research Institute of Malaysia
SME Corp.	SME Corporation
SOP	Standard of Operating Procedure
TNA	Training Needs Analysis
TPS	Toyota Production System
TQC	Total Quality Control
TQM	Total Quality Management
USA	United States of America
VDP	Vendor Development Program
VIN	Vendor Information Network
VPQHSE	Vice President of Quality, Health, Safety and Environment
VSM	Value Stream Mapping
VSS	Voluntary Separation Scheme

CHAPTER 1: INTRODUCTION

1.1 Introduction

Currently, organizations around the world, especially manufacturing companies are adopting quality initiatives (QIs) philosophies and methodologies in order to improve operational and organizations performance in their effort to survive and distinguish themselves from other organizations (e.g., Pambreni et al., 2019; Permana et al., 2021; Thomas et al., 2009). Dale et al. (2002) described QI as "a program of activities with a defined plan and measurable objectives" (p. 382). Three basic principles of QI are customer focus, teamwork and continuous improvement (CI) (Dean & Bowen, 1994). Several QIs have come into existence and become prominent, such as Total Quality Management (TQM), Toyota Production System (TPS) or Lean Manufacturing (LM) (Pegels, 1984), Kaizen, ISO 9001, Six Sigma (Braunscheidel et al., 2011) and Lean Six Sigma (Pepper & Spedding, 2011; Mclean et al., 2017; Al-Khadher, 2015). The QIs were originated from manufacturing industries that focus on continuous processes and product improvement unanimously are considered as one of important strategies to boost manufacturing performance and sustain competitive edge (Yang & Kang, 2020; Liao et al., 2014). High-quality products and services have become normal expectations and requirements globally (Liao et al., 2014). Thus, the QIs implementation becomes a necessity for organizations to meet the expected demands and globalization (Dahlgaard et al., 1990).

QIs comprise incremental improvement and/or revolutionary breakthrough. As a result, some organizations, especially western organizations believed in revolutionary changes, such as processes reengineering and technology breakthrough (Borgianni et al., 2015), which were challenging and required substantial capital and investments. Some organizations are more cautious and opt for incremental changes, such as CI, which only require low costs and simple implementation (Singh & Singh, 2015). However, despite the widespread assumption that QIs implementation would bring benefits and improve organization's performance, the findings from the research conducted related to QIs have been equivocal. While some research demonstrated positive financial impact (C. J. Corbett et al., 2005), other research did not find

any significant changes in the business performance (Staw & Epstein, 2000) and the effects dissipated over time (Casadesús & Karapetrovic, 2005). Besides, some researchers pointed out that some of the QIs (e.g., Six Sigma) approach works well for highly repetitive and predictable tasks but inappropriate for an adaptive organization (Swain et al., 2018).

Scott and Cole (2000, pp. xiv–xx) highlighted a few organization theories that could assist in clarifying the factors that influenced the changes in QIs implementation, such as contingency, resource dependence, evolutionary economics, organizational learning, organizational ecology and institutional theory, as summarized in Table 1.1. There is an increasing doubt and dissatisfaction with the idea that the main reasons of implementing certain practices are due to efficiency factors as rational adaptations to the material aspects (Rogers et al., 2007; Yang & Kang, 2020). In contrast with the traditional theories, institutional theories uphold the view that the organizations' affluence and sustainability are not only dependent on its technical efficiency material aspects, but also on symbolic aspects such as positive images from stakeholders (Lo & Yeung, 2018; Hannan & Freeman, 1984). Several variants of institutional strands have been identified (Greenwood et al., 2008, p.1). Hall and Taylor (1996) proposed three basic schools of thought: 1) rational choice institutionalism, 2) historical (comparative) institutionalism and 3) organizational (sociological) institutionalism. Institutional theory approach from organizational (sociological) institutionalism strand perspective was selected to further examine the QIs implementation because it advocates the idea that organizations' actions and decisions are predisposed not only by the organizations' technical environment, but also by the institutional environment in terms of cultural and cognitive frames, and rule and belief systems (Scott & Cole, 2000, p. xviii).

Institutional theory, such as institution and isomorphism, started to emerge around 1980s (Yeung et al., 2011). Institutional theory discusses institutional development, and it is considered among the powerful theories established that is linked to organization studies (DiMaggio & Powell, 1983; Meyer & Rowan, 1977). Institutional theory stated that organizations implement customary rationalized logics due to the strong institutional and environmental pressures for the sake of legitimacy rather than efficiency, goodwill (Meyer &

Rowan, 1977; DiMaggio & Powell, 1983; Boiral, 2003). Institutional environment consist of various institutional pressures (mechanism); coercive, mimetic, normative pressure (DiMaggio & Powell, 1983) and competition (Beckert, 2010). The pressures may originate from customers, government directives, standards for accreditation, and also competitors (Power et al., 2011; Sila, 2007). Based on previous studies, it was found that institutional pressures influenced organizations' practices (e.g., Shi et al., 2018).

Table 1. 1. *Organization Theories*

Theory	Main theory
Contingency theory (Lawrence & Lorsch, 1967; Thompson, 1967; Galbraith, 1973)	- First attempt to draw into organization theory insights from general systems theory emphasizing the importance of the environment in shaping organization structures and processes (Katz & Khan, 1966). - Insisting that there was no one best way to organize. The design of organizations was supposed to be contingent on environmental factors.
Resource dependence (Pfeffer & Salancik, 1978)	- Focus more on the interdependence of an organization with other organizations in its environment.
Evolutionary economics (Nelson & Winter, 1973)	- Emphasize that one major source of difficulty is that much of the knowledge of work routines in organization possessed by workers is in the form of tacit knowledge.
Organizational learning (Levitt & March, 1988)	- Focus on why and how organizations change their capabilities. - Organizational behavior is based on routines that are "history-dependent": Organization learn by "encoding inferences from history into routines that guide behaviour" (p.320).
Organizational ecology (Hannah & Freeman, 1977; Aldrich, 1979)	- Employ arguments and model developed by biologists and urban sociologists to organizations. - Collections of similar organizations, or "populations," could be viewed as experiencing change processes analogous to those associated with biological species.
Institutional theory (Meyer & Rowan, 1977; DiMaggio & Powell, 1983)	- Emphasizes the ways in which organizations are influenced not only by their technical environment but also by their institutional environments: cultural and cognitive frames, and rule and belief systems.

Note. Summarized from Scott and Cole (2000, pp. xiv–xx)

The initial study of organization based on institutional approaches focused on organizational similarity that stemmed from the early idea of DiMaggio and Powell (1983) on institutional environment, which stated that organizations' structure, culture, and practices in the same field become gradually alike and reach institutional isomorphism in order to demonstrate that they are rational. Institutional isomorphism is essential for organizations' survival and success (Sharma & Hoque, 2002). However, some researchers highlighted that the institutional logic practices, constructions, and culture differ between organizations (Thornton & Ocasio, 2008) due to different organizations and individuals' perception and understanding (Friedland & Alford, 1991) and possible roles of interest and agencies (Dacin et al., 2002); thus, the focus of the study changes toward understanding various organizational reactions to the diversified endogenous and exogenous institutional logic and environment (Delmas & Montes-Sancho, 2010).

Researchers acknowledged that the institutional environment is not uniform, especially in the new market field (Hoffman, 2001). The diverse institutional environment pressures disparate organizations' practices. This may encourage institutional entrepreneurs to integrate two conflicting logics (Dacin et al., 2002; Tracey et al., 2011). Thus, despite the institutional predisposition's environment, the idea of heterogeneity persists and it is impossible for organizations in the same institutional field to accomplish perfect institutional isomorphism across time and space (Thévenot, 2009). Besides, rapid open communication globally makes organizations more flexible and no longer saddled in iron cages (Bhakoo & Choi, 2013)

1.2 QIs in Japan and Malaysia

Japan’s economy rapidly rebuilt after the World War II devastation due to various efforts by Japanese business leaders to enhance capability of the manufacturing companies. The main successful factor was business revolution driven by manufacturing industries in order to raise the quality of products and to begin dominating domestic demand from 1960s and international market territory from 1980s (Ogawa, 2009; Schonberger, 2007). Due to the impact of the business revolution, Dahlgaard et al. (1990) reported that nowadays Japanese

products remain among the most prioritize brand by customers worldwide. Non-Japanese manufacturing companies closely observing the Japanese unique working cultures and production management practices. Schonberger (2007) highlighted three uniqueness discovered in the implementation of quality initiatives. First is Kaizen implementation in the area of employee involvement such as QC Circle whereby The Japanese Union of Scientists and Engineers (JUSE) provided strong guidance and coordination leading its diffusion (Cole, 1989). Second is exceptional quality mindset based on total quality control (TQC) or company-wide quality control (CWQC) practices. Third is the production system developed by Toyota known as just-in-time (JIT), TPS or recently as LM.

Early empirical studies concluded that the Japanese give a very high priority to elements such as top management commitment, product quality planning, shop floor quality control (Ahire et al., 1996). Furthermore, Japanese companies emphasize the importance to the information of new research or products, competitors' data, new techniques, and market commercial possibilities (Dahlgaard et al., 1990). Besides that, Japanese workers are regarded as well disciplined, loyal to their leaders, and above all, team-oriented (Khoo & Tan, 2003).

While Deming and Juran played as he key roles in Japan's quality development, and later the West's quality consciousness, much of the Japanese quality management development is owed to the work of various Japanese quality experts such as Dr. Kaoru Ishikawa, whose developed seven quality tools (7QCs) and also as one of the primary developer of the quality-control circle methodology (Schonberger, 2007). The seven basic tools are Ishikawa diagram, check sheet, Pareto chart, histogram, stratification, scatter diagram, and Shewart control chart (Bamford & Greatbanks, 2005). Significantly, Dr. Kaoru Ishikawa is also considered to be the primary developer of the quality-control circle methodology (Schonberger, 2007).

The history of quality initiatives in Malaysia is slightly different from Japan. Since Japanese business revolution impacts internationally, Malaysia began implementing QCC in 1971 through Japanese multinational manufacturing company, known as Matsushita Co. (Malaysia) Ltd. Since then, Malaysia 4th Prime Minister, Mahathir Mohamad launched the Look East Policy (LEP) in 1981 to shift Malaysian business-policy paradigm to start focusing

on country development and institutionalization of Japan and Korea instead of only East countries. The paradigm shift has proven as a turning point to inspire manufacturing companies in producing high quality products and to support in building Malaysia as developed country.

The year 1990s witnessed the intensification of interest in quality management activities in literally every sector of its economy in Malaysia. Lasserre & Probert (1994) conducted a survey on foreign companies in Asia Pacific Region and found out that quality expectations in Malaysia were better than in most other Asia countries. They speculated that high quality demand in Malaysia might be due to the influence of Japanese companies operated in Malaysia. The survey conducted by Idris et al. (2012) revealed that Malaysian organizations are paying more attention to the needs of management standards and best practices and there is a steady increase in the number of organizations adopting new management standards.

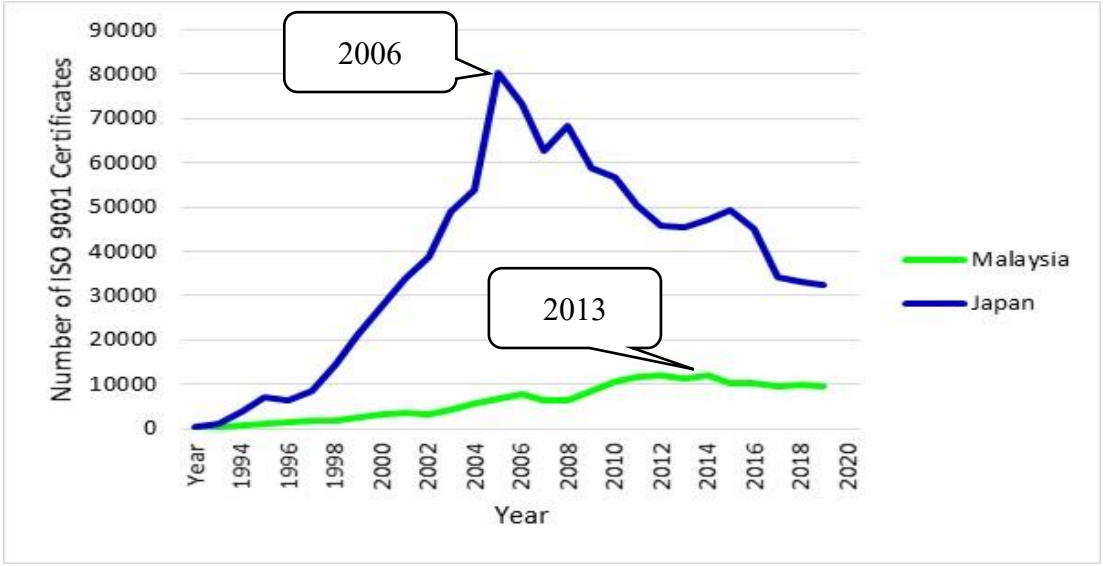
Quality initiatives in Malaysia are relatively influenced by multinational companies such as Japanese and American companies. For example, (Agus & Abdullah, 2000) reported that TQM programs are widely used by manufacturing companies in Malaysia to enhance their financial performance (Mehra & Ranganathan, 2008). However, more than 70 per cent of TQM companies has only recently adopted the TQM initiatives (Idris et al., 1996). Besides that, the number of years of TQM involvement for Malaysian SMEs is generally lower and it still has a long way to go in their journey towards TQM (Eng & Yusof, 2003).

Another example is UMW Toyota Motor, a joint-venture company between Malaysian conglomerate UMW Holdings and Japanese auto giant Toyota Motor Corporation, which has been striving to implement lean manufacturing in its business operations since 2007 (Rusli et al., 2014). The manufacturing concept is not only being implemented in the various operations of its manufacturing plant, but also to its suppliers (Rusli et al., 2014). Hence, due to external demands from customers, suppliers will have to implement and adapt the concept of lean manufacturing. On the other hand, best practices such as Six Sigma were introduced by an American company, Motorola in 1995 while Lean Six Sigma was successfully introduced by another American company, GE Engine in 2000 (Idris et al., 2012). The concept of Lean Six Sigma was considered relatively new to many Malaysian organizations and most of those

organizations implementing Lean Six Sigma belong to electronics and electrical, and automotive industries (Eng & Yusof, 2003; Idris et al., 2012).

Since 21 centuries, manufacturing companies in Malaysia take one step further to enhance internal processes and developed high quality products by pursuing for ISO 9001 certification. Figure 1.1 depicts the ISO 9001 certificates issued in Japan and Malaysia based on extracted available data from the ISO surveys from 1993 until 2020. The total number of certificates issued in Japan and Malaysia were not so much different in 1993 (Japan, n = 434 and Malaysia, n = 224). However, the numbers of certificates issued in Japan increased drastically from 1993 (n = 434) to 2006 (n = 80,518) and then gradually decreased until 2020 (n = 32,287). As for Malaysia, it can be observed that the numbers of certificates issued were gradually increased and reach the peak in 2013 (n = 12,002).

Figure 1. 1. *Number of ISO 9001 Certificates in Japan and Malaysia*



Note. Summarized from the ISO survey result, 1993 to 2020.

1.3 Research Motivation

A few research gaps were identified which can motivate researchers to pursue further in understanding QIs from institutional theory perspective. First gap is in identifying the mechanism of convergence and divergence practices which determine the QIs level of implementation. Some research findings related to QIs implementation mentioned that the QIs implemented cannot be maintained and sustained in the long run (McLean et. al, 2017, Paipa-Galeano et al., 2020) while some identified that the companies capable to sustain the implementation (Mcgovern et al., 2017). Various organizations anecdotally support the effectiveness of QIs implementation (Swain et al., 2018). However, despite the substantial efforts spent in QIs implementation, many organizations continued to experience quality problems and failed in meeting its desired benefits and results (Willison & Buisman-Pijlman, 2016; Mclean et al., 2015).

Several authors highlighted that the factors contributed to the level of QIs implementation were not only due to technical, but symbolic aspects as well. Cameron and Sine (1999) highlighted that the failure rate was expected to be high if the QIs were introduced without much changes on the culture of the organization. Inuwa and Rahim (2020) is in line with this notion and emphasized the importance of symbolic aspects, such as culture and called for further investigation to understand the interplay between symbolic aspects and QIs practices. Moreover, besides culture, Gonzalez (2011) highlighted that the external pressures imposed on the organizations to adopt QIs practices might heighten employees' resistance if they perceived that the QIs practices was not effective and beneficial. Furthermore, failure to understand the pressures will affect the management commitment level, hence will increase management resistance (Liao et al., 2014).

These factors could contribute to the low level of QIs implementation, and thus, impedes the QIs institutionalization process. Therefore, among the factors that contributing to the level of the QIs implementation may closely related to symbolic aspects and involved certain managerial actions and interactions between people in the organization, while being exposed to institutional pressures imposed by internal and external stakeholders populated in a

particular environment and culture. This may be explained by an appropriate organization theory, such as from the institutional theory perspective (Arumugam et al., 2014).

There are various responds to the institutional pressures and heterogeneity in QIs adoption. It is recommended to examine the impact of all the institutional pressures on quality management practices in order to grabs the whole pictures on how organizations respond to institutional pressures (Yang & Kang, 2020). However, previous studies did not look in depth on organizations response to institutional pressures in implementing and disseminating the QIs (e.g., TQM) implementation (Dubey et al., 2018).

Second gap is in terms of QIs institutionalization. Empirical study related to institutional pressures is inadequate and researchers did not ponder in depth from the social interaction point of view the condition on how QIs become instilled with symbolic value hence institutionalized (Glover et al., 2014; Sartor et al., 2016, Lo & Yeung, 2018). In addition to that, researchers seldom evaluate institutionalization level precisely (Barley & Tolbert, 1997). Furthermore, Yang and Kang (2020) mentioned that the study of institutional pressures influence and the dynamic relationships among the QIs had not been conducted and their impacts on organizational level actions and benefits were negligible (Shi et al., 2018).

Institutional study mentioned that diversity and modification could happen within a stable system and environment (Goodrick & Reay, 2016). However, there is a lack of study devoted to the instability, change, or failure of institutionalized practices' context, (Scott, 2001) such as the QIs. Thus, institutional theory researchers are recommended to focus more on instabilities and institutional change instead of the dominant view of stability and durability of institutionalized practices (Gonzalez, 2011) as exploring paradoxes is one of the ways for advancing the theory in management (Handfield & Melnyk 1998; Yang & Kang, 2020).

Moreover, Beckert (2010) highlighted that the new sociological institutionalism had placed much attention on isomorphism institutional development, while neglecting the opposing heterogeneous development. This study highlighted that under certain mechanisms, the institutional practices might lean towards convergence or divergence. There is an opportunity for further enhancement of this theory because these conditions are still indefinite.

Therefore, further clarification is required to examine the mechanism that will lead to isomorphism or heterogeneity practices.

The third gap is QIs dissemination in terms of driving forces and role of actors or agents. Some challenges exist in implementing QIs, such as the reasons for the implementation, and understanding in linking the benefits and legitimacy concerns (Liao et al., 2014). For the past few decades, even there had been discussions related to organizational logics for QIs adoption (Abrahamson, 1991; Kennedy & Fiss, 2009), Braunscheidel et al. (2011) highlighted that there is less of empirical research related to the driving forces for organizational logics of QIs adoption (e.g., Six Sigma) and how certain practices emerge or why the dissemination is restricted and unsuccessful (Barley & Tolbert, 1997). This view was supported by Liao et al. (2014), who stated that most existing survey-based quantitative research method conducted studies to investigate the QIs driving forces through economic analysis, which was related to the first institutional strand, rational choice institutionalism.

"Economists believe that people and organizations are rational in maximizing their own benefits" (Lo & Yeung, 2018). This view is in contrast with institutional perspective beliefs, whereby institutional pressures influence individuals or organizations to implement certain practices regardless of its efficiency or profound changes (Castka et al., 2015). Lo and Yeung (2018) is in agreement with DiMaggio and Powell (1983) persuading argument that justification from marketplace and competitive pressure mechanism were no longer adequate in explaining the reasons influencing organization to implement certain practices. For example, Turkulainen et al. (2017) in their supply chain study speculated that TQM was widely disseminated due to imitation (mimetic institutional mechanism) instead of suitability to the organization's strategic consideration. Nikolaeva (2014) highlighted that previously theoretical model considered imitation as less optimum and non-rational and only recently it has been accepted that organization may gain benefits from it. Therefore, from the above argument, it can be concluded that there is still a lack of critical qualitative research about the manager's logic on the driving forces from the organizational (sociological) institutionalism perspectives.

Besides, there are arising attention in institutional theory related to entrepreneurship on the interest of actors, agents and carriers in QIs dissemination which are considered important for institutional realization (Greenwood et al. 2008; p. 25; Yeung et al., 2011; Stephan et al., 2015). For example, professions are carriers for normative isomorphism and their roles are significant for institutional realization. Further research could examine whether active actors' behaviours and support such as leaders could influence team members' level of commitment in sustaining the QIs implementation (Tortorella et al., 2021). Researchers could examine factors related to variation and stabilization of aspirations, interaction between cultural and actors experiential factors and probe more deeply on the questions of how, why, and under what settings influence some actors deviate from the practices (Vidal, 2017). Furthermore, Yang et al. (2020) emphasize the needs to identify the interrelationship between individual and institutional environment from both macro- and micro-institutional perspectives. Micro-level perspective able to provide a more detailed explanation supporting the macro-level approach and findings.

In addition to that, Mutingi and Chakraborty (2021) mentioned that previous studies of QIs diffusion were mostly conducted in industrialized developed country and there is scarce information related to the QIs implementation, especially from developing countries (Sila, 2018). There is a need to study the variance in emulation, actors engagement, and institutionalization of the practices both at source and its recipient country (Özen & Önder, 2021). Therefore, it will be interesting to study the diffusion in a developing country such as Malaysia. In addition to that, Friel and Pinot de Villechenon (2018) emphasized that further study need to be conducted to understand how specific national institutions shape the adaptation of QIs practices and institutions influence which enable companies to adapt these practices in similar or different ways. Consequently, further studies are necessary in identifying the driving forces and its actors and grasp insights from the perspectives of practitioners to gain more understanding about the QIs implementation.

1.4 Research Objectives and Questions

From the identified research gaps, this research aims to identify factors that differentiate the QIs implementation between Japanese and Malaysian manufacturing companies in Malaysia using institutional approach from the lens of organizational sociology perspective. Institutional approach from organizational (sociological) institutionalism perspective is selected because it is an active area of theory and research which emphasizes that organizations are influenced not only by their technical environments but also by their institutional environments (Scott & Cole, 2000). The approach covers broader areas as most economists and political scientists focus exclusively on economic or political rules, and sociologists find institutions everywhere, from handshakes to strategic-planning (DiMaggio & Powell, 1991, p. 9)

In today's business environment, the rise of global competition is one of the factors that drives the need for process improvement, particularly in the manufacturing industries (Marques & Matthé, 2017). Since manufacturing is considered as one of the economy's backbones in most countries, several studies highlighted the need to maintain and build manufacturing capabilities to support the economic growth and others (Reynolds & Uygun, 2018; Chang, 2012). Powell (1991, p. 189) recommended that for organizational institutionalism research, the focus should not be confined to the public and non-profit sectors and that more attention should be directed to core sectors of the economy, such as manufacturing. There is a lack of organizational (sociological) institutionalism study that covers the manufacturing sector due to the assumption that the manufacturing sector is a highly competitive field and market driven in nature, which are mostly confronted with weak institutional pressures (Scott, 1991, p. 187; Oliver, 1997). However, this assumption could be disputed, as highlighted by Scott (1991, p. 168) that productivity might play small roles in ensuring the survival of some market driven organizations. Therefore, it could be concluded that further study of QIs implementation in the manufacturing industry from the organizational (sociological) institutionalism theory perspective is indeed necessary.

To study the effect of differences of management culture and practices was one of the reasons why Japanese- and Malaysian-based companies in Malaysia were selected. Malaysia is benefited significantly from economic relations with Japan (Khalid et al., 2015). Besides, it will be interesting to explore QIs dissemination from the source of the QIs origin such as Japan to developing country such as Malaysia with the fact that the popularity and importance of Japanese-style concepts of TQM or Kaizen in Malaysian manufacturing companies are still remained and keep intact.

Additionally, QIs became well-known and important in the business field, as one of the critical success elements sustaining the organization's performance and survival. QIs, such as TQM gains institutional value over time (Zbaracki, 1998) because it becomes a norm and the accepted method of doing things. Since the Japanese-style QIs ideas are considered essential in Malaysian manufacturing companies (Khalid et al, 2015), therefore, it is worthwhile to view QIs practices both Japanese and Malaysian manufacturing companies in Malaysia from the institutional theory perspectives.

From the research gaps highlighted, three main research objectives were identified:

1) To identify the convergence and divergence practices between Japanese and Malaysian manufacturing companies that affecting the degree of QIs institutionalization.
2) To discover on how the QIs implementation are disseminated in Malaysian manufacturing industry.

Three research questions (RQs) have been formulated in order to fulfil the research objectives as listed below:

RQ1: Why there are convergence and divergence practices between Japanese and Malaysian manufacturing companies?

RQ2: What are the degree of QIs institutionalization?

RQ3: How QIs are disseminated in manufacturing companies in Malaysia?

RQ1 and RQ2 focus on organizational-field level study while RQ3 examine the interaction within the national-field level. RQ1 and RQ2 serve to answer objective 1 in identifying the similarities and differences between Japanese and Malaysian companies and go in depth in explaining why there are similarities and differences even the companies are operating in similar environment. Hence, evaluation assessing the degree of QIs institutionalization was made to gauge the QIs institutionalization in the case study companies. As for the objective 2, RQ3 examine on how QIs are disseminated in manufacturing companies while focusing on the driving factors imposed by actors and agents involved during the dissemination process.

1.5 Research Scopes

In order to explore the quality initiatives that are being practiced, recognize important factors and barriers as well as evaluating the degree of implementation, Japanese manufacturing companies in Malaysia are being selected as a platform for benchmarking and comparison with several Malaysian manufacturing companies. The manufacturing companies that have gained at least 15 years of establishment and 5 years of ISO 9001 implementation are desired and categorized within three different sectors (plastic-based, machinery and equipment-based, as well as chemical-based companies). Within those 15 years, the companies should have experienced in tackling economics crisis issues such as Lehman shock and collapse of bubble economy. Previous study mentioned that period of transition is between zero to three years, stability is between three to five years and maturity is more than 5 years (Ahire et al., 1996). Therefore, it was decided that minimum of 5 years ISO 9001 implementation experience is required to ensure that the case study companies quality initiative implementation are in the maturity stage and the companies are currently fine tuning in maintaining and sustaining the ISO 9001 implementation.

According to Oxford business review (2017), Malaysian government has three "catalytic" subsectors under the 11th Malaysia Plan (11MP); chemicals, electrical and electronics (E&E) and machinery and equipment (M&E) in order to drive the manufacturing sector's transition to the higher-value and higher-technology production. Based on manufacturing statistics in 2017, which was reported by Department of Statistic Malaysia (DOSM), petroleum, chemical, rubber and plastics sectors contributed to top sales value representing 21.0% of total sales value, followed by Electrical and Electronic (E&E) sector, which is 19.8%. However, Mechanical and Electrical (M&E) is not a big sector in Malaysia and it only representing 4.6% of sales value (including transport equipment. Nevertheless, M&E is considered as one of the important subsectors by 11MP. E&E sector was excluded in this research since it was found that a few researchers (Ahmad & Yusof, 2010; Utami et al., 2021) already conducted the QIs implementation study in the E&E sector in Malaysia. Therefore, the research scope will focus on these three sectors; plastic-based, machinery and equipment-based, and chemical-based companies.

1.6 Significance of the Study

This research intend to enrich both practical and theoretical areas in quality management and organizational (sociological) institutionalism. By identifying the key success factors and point of convergence and divergence between Japanese and Malaysian companies, this study contributes to the quality initiatives implementation understanding. Recognizing key success factors of QIs implementation and its benefits is essential for practitioners to obtain the overall pictures. Practitioners able to learn from the details review of QIs implementation, get the ideas beforehand hence prioritize the identified important practices. Besides, investigating the factors contributing to the failure of QIs and how to prevent it is an interesting research area that definitely attract managers and practitioners attention. In addition to that, distinguishing the normal culture and distinctive practices utilized in developing country such as Malaysia offers organizations especially multinational companies further insight to consider related important factors when expanding their operations overseas. As for Malaysian

companies, this research definitely can serve as a benchmark to identify the best practices in order to get rough ideas on how to improve and raise the level of the quality management system.

Furthermore, understanding the antecedents such as motivation behind the QIs adoption, and clarifying the driving forces and significant actors involved in disseminating the QIs able to enhance further body of knowledge especially in institutional theory building through several propositions and recommendations for future study. The developed propositions provide interesting insights and give deeper understanding on how the manufacturing companies respond to the imposed institutional pressures. Furthermore, the derived degree of QIs institutionalization of the case study companies clarified the condition in which the companies implement the QIs ceremonially or whether there are indeed real changes to their technical core practices.

1.7 Structure of the Thesis

The remaining chapters are structured in line with the sequence of how the research was conducted. Chapter 2 summarize an overview related to QIs and institutional theory. Five QIs; Kaizen, TQM, LM, Six Sigma and quality management system (QMS) are reviewed and the relationship between QIs are discussed. Institutional theories are discussed thoroughly as well such as the publication trend related to manufacturing industries and three research themes related to the research questions; QIs convergence and divergence practices, QIs institutionalization and QIs dissemination. Chapter 3 describes the research methodology corresponding with case study approach based on Eisenhardt (1989) eight steps research methodology. Five steps are discussed thoroughly from step 1 which include detail explanation on how the critical review was conducted to step 5 on how the analysis was conducted.

As for chapter 4, organizational level findings consist of the overview of each case study company, QIs history and the implementation status are described in detail. Furthermore, implementation difficulties, Important factors, benefits, contingency plan and future trend are explained thoroughly as well. Chapter 5 describe the research findings at the national level in

Malaysia which covers contribution of related government agencies and education entities such as universities and vocational colleges. As for chapter 6, from the summarized interview results and second sources information, further analyses are discussed thoroughly. Among the analyzed items are regarding the status of each QIs such as quality management system, Kaizen, LM and Six Sigma. In addition to that, important factors, within-case and cross-case analysis, degree of institutionalization and how QIs are disseminated in Malaysia. At the end of the chapter, establishment of research propositions and enfolding literature are discussed comprehensively as the key findings of the research which should contribute to the body of knowledge and practitioners. Chapter 6 summarizes and concludes the research outcomes based on the research questions as well as the research implications. Last chapter which is chapter 7 presents future recommendation for other researchers and research limitations.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This research focuses on QIs implementation and institutionalization from institutional theory perspective. Therefore, the literature is broadly classified into two categories for a general overview: QIs and institutional theories. Then, further in-depth discussion is covered related to the three research questions: QIs convergence and divergence practices, QIs institutionalization, and QIs dissemination.

Several key terms related to this study are defined for better understanding. The QIs in this study refers to QMS and continuous improvement (CI) initiatives conducted in manufacturing companies, either at the management, group, or individual level. The adoption of QIs mean that the QIs are not implemented in the organization previously. Fad refers to the QIs practices that have been adopted but still lack of institutionalized practices in the organization (Abrahamson, 1991). The view from the institutional theory lens signifies that the QIs practices are properly embedded with the system, resulting in low probability of dissolvement even under various pressures (Zeitz et al., 1999). As for institutional network ties, it refers to linkages with various entities that organizations depend on to enable them to operate in a market, such as government agencies, financial institutions, universities, and associations (Varma, 2013). This research divided the analysis into two categories which are meso and macro analysis. Meso analysis is based on organizational-level derived from the case study companies while macro analysis is based on national-level consisting of government agencies and higher education entities.

2.2 Quality Initiatives Overview

The QI names may have changed over time and eras and the definitions and practices may differ between each QIs. However, the QIs main objectives and origin is identical (Reddy et al., 2017). Based on (Garvin, 1988, p. 37) there were four stages of quality eras, which included inspection, statistical quality control, quality assurance and strategic quality

management. Next section discuss each QI in detail from Kaizen which was started to emerge around 1950s followed by TQM, LM, Six Sigma and QMS.

2.2.1 Kaizen

Manufacturing industries in Japan are continuously gaining benefits and demonstrate higher performance resulted from the fine-tuning and enhancement of the production processes. The distinction is clearly recognizable after the Japanese companies embedding Kaizen as part of the parcel in routine manufacturing operations (Ashmore, 2001). Kaizen is a philosophy introduced in 1950 and recognized as a process-oriented concept (Saleem et al., 2012) for CI in order to enhance production performance reduce cost, and upgrade the quality of product and process (Singh & Singh, 2009).

The terminology of CI originated from "Genba" (shopfloor) (Gapp et al., 2008) kaizen which refers to a place that adds value (e.g., production area) or can be simplify as "go and see for yourself" (Macpherson et al., 2015). Kaizen can be categorized into three orientation types: management-oriented Kaizen, group-oriented Kaizen, and individual-oriented Kaizen (Imai, 1986). Management-oriented Kaizen focuses on management commitment to draw a company strategy to encourage full employees' participation. Whereas group-oriented Kaizen emphasis on workforce teamwork to perform SGA in solving production issues without any interference from management, while, individual-oriented Kaizen mainly relates to employee personal initiatives and capability to personally generate innovation idea to resolve occurred production issue.

Kaizen is a business strategy to excel manufacturing companies in facing highly pressured and competitive market from various sectors, including automotive. Japan introduced Kaizen as the CI initiative and endless practice by the management and employees of an organization to deliver full commitment and generate innovative ideas, respectively, to support the organization. Hence, Toyota introduced and applied Kaizen as a CI tool to enhance production efficiency, product quality, and market competitiveness (Imai, 1986) by

constructing process-oriented minded throughout the organization in obtaining high-quality output.

Kaizen is widely applied worldwide, and employees become the main players (Brunet & New, 2003) to drive the success of Kaizen implementation in every organization since they are more knowledgeable with regard to daily behaviors and issues of production line. The common issues in production line consists of product waste, less safety factor, low productivity, machine setup time breakdown, excessive lead time (Cheser, 1998), no ergonomic workstation, low compatibility of production tools and equipment, and raw material quality issues (Radharamanan et al., 1996). As indicated by Brunet and New (2003) even though researchers described diverse Kaizen key elements, a common understanding established is that Kaizen is continuous and endless embedded activities by frequent participation of highly creative workforce in achieving quality and efficient production process and subsequently enhancing organization performance (Brunet & New, 2003).

Besides, other activities corresponding to Kaizen are zero defect mindset within organization, suggestion schemes as continuous inspiration to workforce, policy setup by top management, and a small group activity by workforce. Typically, Kaizen is a bottom-up approach (Saleem et al., 2012) applied by an organization to encourage workforce to lead and perform enhancement on any minor scale project at one time basis with a limited time frame. Therefore, Kaizen philosophy is significantly proven to deliver various benefits to manufacturing companies (Singh & Singh, 2009) in order to reflect the ever-changing market demand (Brunet & New, 2003).

As Kaizen can generate and innovate ideas from the workforce, one of the most effective approaches to produce the ideas are via QCC or Small Group Activity (SGA). QCC is a group-based activity to determine, investigate, analyze, and overcome problems in a workplace (Ishikawa, 1985, pp. 141-142). However, full commitment from the top management is essential (Lillrank, 1995) in order to afford sufficient facilities so that QCC group members' motivation is continuously high to perform problem-solving tasks that exist, especially in the production line. The motivation may be further increased through reasonable

incentives and promotion systems in the organization. Hence, QCC is a self-motivated activity (Bessant et al., 1994) led by production supervisors or foremen to discuss and brainstorm any new issues within the group, as well as through cross-functional teams (Ishikawa, 1985, p. 145)

Since most of the participated members are equipped with wide-ranging of hands-on experience, the QCC activities are anticipated to influence the management to continuously support Kaizen as one of the effective quality improvement initiatives within the organization. Therefore, it can be concluded that QCC can efficiently contribute in cost reduction with regard to production techniques and facilities. The QCC solid solution is anticipated to be possible through root cause analysis, which is collectively performed by dedicated production team consisting of five to eight production members. Within the team members, minor and major issues are collectively discussed using quality techniques, such as cause-and-effect diagram or Ishikawa diagram prior to identifying the root cause and finalize the countermeasures. Subsequently, the positive implication of the QCC may lead to several positive results companywide, such as team building establishment, enthusiasm in problem solving, bottom-up communication improvement, as well as harmony relationship horizontally and vertically in the organization.

Tortorella et al. (2021) conducted an interesting study related to the influence of team members' characteristics on the sustainability of continuous improvement initiatives. They summarized 11 CI team characteristics that favour CI initiatives sustainability from 15 articles which 'job autonomy and empowerment' is the most frequently cited while 'relatively fixed membership throughout time' is the least cited. From the study, it was found that the two main factors: workers' seniority and membership time within groups were positively related to operational performance results.

2.2.2 Total Quality Management (TQM)

TQM is a management philosophy and approach that encourages customer's satisfaction, CI, and teamwork (Tsang & Antony, 2001) in enhancing the quality of processes, products, and services (Saleem et al., 2012). TQM was originally called total quality control

(TQC) which was originated from USA around 1957. Then, it was disseminated to Japan whereby Japanese companies improvise the concept and it became company-wide quality control (CWQC). Based on the concepts and philosophy, Japanese companies were the first to penetrate markets with quality management concepts, followed by western companies. Once popularized, it travelled back to the United States of America (USA) and western and the terms changed to TQM.

TQM by definition is the management of the entire organisation so that it excels in all dimensions of products and services that are important to customers (Wilkinson & Witcher, 1993) is an organization-wide philosophy and problem-solving methodology that focuses on five intervention cores related to customer requirements, supplier partnerships, cross-functional teams, utilize scientific method for improvement, and heuristics process management (Hackman & Wageman, 1995). TQM approach creates awareness and is a cost-effective system for integrating the continuous improvement efforts of all employees which focuses on ensuring customer satisfaction. TQM has become a global phenomenon as it affects Japanese companies as much as US, European and Asia-Pacific ones (Corbett & Rastrick, 2000). It also has been considered as an appropriate method to improve the competitiveness of companies in developing countries (Montes et al., 2003) such as Malaysia. There are 12 TQM implementation constructs as highlighted by Ahire et al. (1996) and the constructs are: top management commitment, customer focus, supplier quality management, design quality management, benchmarking, Statistical Process Control (SPC) usage, internal quality information usage, employee empowerment, employee involvement, employee training, product quality and supplier performance.

Top management commitment has been identified as one of the major determinants of successful TQM implementation (Ahire et al., 1996). Besides that, culture-related factors are important for implementing TQM because on top of having to establish a quality system, a quality culture is required for sustaining the practice (Khoo & Tan, 2003). Many chief executive officers (CEOs) are beginning to realise that finding good people has become an increasingly important key to the survival of the business (Lau & Idris, 2001). Besides

increasing the top management awareness about TQM, managers have a power to encourage their employees to enhance their knowledge and skills, create more proactive behavior, as well as improve employees' ability to perform daily tasks in more efficient and effective ways.

Other than manufacturing companies, TQM is also being widely applied by service companies. Typically, TQM practices are classified into “soft” and “hard” practices. “Soft” practices refer to the social and/or people-based issues, especially those related to customers and employees, while “hard” practices refer to the more technical tasks and techniques to improve company production process (Lam et al., 2012; Rahman & Bullock, 2005). Hradesky (1995) in his book proposed 10 tracks for implementing TQM program: foundation, implementation, cultural, recognition and reward system, leadership/team-building, management skills, core techniques, advanced techniques, customer focus, and train the trainer track.

2.2.3 Lean Manufacturing

Lean Manufacturing is a concept or approach created by Japan industries after the Second World War to rebuild the industries (Bhamu & Sangwan, 2014). Subsequently, the top management of manufacturing industries recognizes that Lean Manufacturing is highly beneficial toward the implementation of waste reduction initiatives since it supports the production systems to produce products and services at minimum costs, as well as deliver the products and services in short lead time. Hallgren and Olhager (2009) described that Lean Manufacturing aims to enhance operation efficiency by determining product values and product waste while Pearce et al. (2018) stated that Lean Manufacturing is able to eliminate product waste, enhance organization technical know-how, as well as develop better working culture. For example, Toyota gains Lean Manufacturing benefits through efficient inventory systems, less investment in waste management, and shorter new product development in order to launch new products more rapidly than other competitors. Therefore, the concept of Lean Manufacturing is similar to Toyota Production System (TPS) established by Taiichi Ohno.

Furthermore, numerous organizational practices (e.g., process control and improvement, workforce development, and customer focus) implementation were found able to deliver positive significant impacts, hence increasing the effectiveness of business performance (Abreu-Ledón et al., 2018). However, researchers (Krafick, 1988; Womack & Jones, 1994) elaborate Lean Manufacturing differently. By implementing Lean Manufacturing, manufacturing companies may obtain approximately half of the employees' effort, half of the workplace, half of the facilities' investment, and half of the product development lead time (Krafcik, 1988). Womack and Jones (1994) defined Lean Manufacturing as an alternative tool, methodology, and strategy in the NPI lifecycle. Meanwhile, Hayes and Pisano (1994) stated that Lean Manufacturing is a concept that requires a minimum of everything (e.g., man, material, machine, and method) to produce a product or perform a service. In addition, Lean Manufacturing is anticipated to reduce the product delivery time to end users after eliminating product waste in the production line (Liker & Morgan, 2006).

2.2.4 Six Sigma

Six Sigma is a project-oriented approach applied by organizations to identify product variability and defects, as well as eliminate product and process waste through statistical techniques (KlefsjoÈ et al., 2001). Six Sigma is defined as 3.4 defects per million opportunities (DPMO) (Deniz & Çimen, 2018). Therefore, DPMO is calculated to identify the level of Six Sigma in every process. Since the main intention is to reduce process capability, the specification limits are at least six standard deviations from the target (Montgomery & Woodall, 2008). Six Sigma was developed by a Motorola engineering expert, Bill Smith in 1986 target (Montgomery & Woodall, 2008) for two major objectives: to upgrade product quality and to reduce product defect. Many researchers reported the significant benefits gained by Motorola, a giant semiconductor manufacturing company through Six Sigma implementation target (Montgomery & Woodall, 2008).

Since then, Six Sigma has spread worldwide and subsequently implemented by other recognized organizations (e.g., American Express, Ford, General Electric, Caterpillar, Bank of America, Citibank, Boeing, and Sony) (Klefsjö et al., 2001). In order to exactly perform Six Sigma, the organization shall develop, employ, or hire an expert or a Six Sigma group. The experts or group members need to be qualified with Green Belt (GB), Black Belt (BB), and Master Black Belt (MBB). GB represents the personnel who have attended one or two weeks of Six Sigma course, BBs train GBs, whereas MBBs have conducted Six Sigma course to GBs and BBs (Montgomery & Woodall, 2008).

Several quality tools and techniques, such as statistical tools, process capability analysis, and control charts are also applied to support the success of Six Sigma implementation. Nevertheless, the key driver is the top management because Six Sigma is a top-down approach that requires enforcement and full commitment from the Chief Executive Officer (CEO), managing directors, and managers to build a Six Sigma culture in organizations. Subsequently, the medium hierarchy level in organizations, such as engineers and executives, will execute and manage subordinates to cooperate together and apply Six Sigma in respective projects.

Usually, the Six Sigma implementation is approximately four to six months of period per project by performing problem-solving phases, known as DMAIC (Define, Measure, Analyze, Improve, and Control). “Define” is a process identification phase whereby product- or service-related problems are comprehensively studied in order to eliminate customer compliant. In the “Measure” phase, sufficient data in the process are collected for process performance understanding, hence measure via several statistical tools (e.g., histogram, Pareto diagram, and scatter diagram). “Analyze” phase is an identification of the relationship between cause and effect whereby the Six Sigma team members are responsible to identify the potential cause for the detected defects and investigate other issues related to quality, customers' complaint, and product waste. Hence, control charts, failure mode and effect analysis (FMEA), and hypothesis testing are commonly applied to analyze the data. “Improve” phase is a counter-measure process to resolve the issues, as well as to find the best solution for process improvement. Meanwhile, “Control” phase is monitoring and maintaining the processes where

the best solution can also be practiced in other processes and projects. A process owner will use a process control chart as an important statistical tool to ensure the project is continuously well-managed.

2.2.5 Quality Management System (ISO 9001)

The ISO 9000 series of standards consist of ISO 9001 (QMS requirements, ISO 9000 (QMS fundamentals and vocabulary (definitions)), ISO 9004 (guidance to achieve sustained success (continuous improvement)) and ISO 19011 (guidelines for auditing management systems). ISO 9001 term is used throughout this thesis because the QMS requirements for the certification is under ISO 9001 standard and well known among the manufacturing companies around the world.

ISO 9001 is established to guide organizations in pursuing CI goals and subsequently fulfilling market requirements. Historically, ISO 9001 was introduced in 1987 by international organization for standardization (ISO) focusing in quality assurance field and once established, it was acknowledged as ISO 9001:1987 version. Then, the second version was enhanced and released to the market by embedding with preventive action requirements. Further enhancement was performed on ISO 9001 whereby a third version (ISO 9001:2000) comprised of quality management requirements introduced for organizations' further attention in order to continuously produce high-quality products and services. However, the third version did no longer exist after the next new version, which is ISO 9001:2008 that entered the market.

In terms of the transition, the ISO 9001:2008 can no longer be used and is considered obsolete after 15th September 2018. Therefore, the ISO 9001:2008 certified organizations need to comply with the new version through the transition-related audit process (Fonseca & Domingues, 2018). Currently, the latest new version (ISO 9001:2015) is available since September 2015 (Fonseca & Domingues, 2018) for all ISO and non-ISO certified organizations to refer to before the transition and certification processes, respectively. This latest version is more significant compared to the previous version (ISO 9001: 2008) which consists of ten clauses (Scope, Normative References, Terms and Definitions, Organizational Context,

Leadership, Planning, Support, Operation, Performance Evaluation, and Improvement) and mainly focuses on risk-based thinking, which may guide organizations to investigate and determine internal and external risks. Besides, this version also focuses on leadership and management comprehensive commitment, shareholders' and knowledge management requirements, as well as digital documentation practice (Fonseca, 2015).

With regard to ISO 9001 certified organizations (e.g., manufacturing companies), the QMS of the organizations are anticipated to be well-organized in order to ensure business processes aligned with ISO 9001 requirements. Since ISO 9001 supports the organizations in management system, including CI activities, several highly applied QIs program or approaches, such as TQM (Breja et al., 2010), Kaizen (Cheser, 1998), Lean Manufacturing (Dahlgaard & Dahlgaard-Park, 2006) and Six Sigma are also being performed by organizations. All the systems or approaches are able to ensure high efficiency and effectiveness from the new product introduction (NPI) with minimum investment and cost until the product enters the competitive market with reasonable price. Therefore, among the reasons that drive the top management to enforce their organizations to fulfill ISO 9001 requirements and implement quality-related systems or approaches is to gain high value in the process and product development, production, and delivery processes.

2.2.6 Relationship between the QIs

Table 2.1 show the main key features of the QIs while appendix I shows highlighted QIs elements by various authors. The QIs elements is summarized in Table 2.2 and can be divided into two categories: hard practices and soft practices. According to Klefsjö et al. (2001) TQM is the umbrella for most of the quality initiatives which encompassed three features, which are values (e.g., management commitment, customer focus, CI), methodologies (e.g., Six Sigma, Kaizen, Lean Manufacturing, and Quality Function Deployment), and tools (e.g., 7QC tools). Therefore, Six Sigma, Kaizen, Lean Manufacturing, and ISO 9001 are the methodology and tools contained by TQM (Klefsjö et al., 2001).

Table 2. 1. The Main Key Features of the QIs

TQM	ISO 9001	Kaizen	Lean manufacturing	Six Sigma
3 managerial approaches (Dahlgaard-park et al., 2013) 1) Process Management 2) Human Resource Management (HRM) and 3) Strategic Management	Standard system using a process approach PDCA (ISO 9001:2015 (JIS Q 9001:2015) Standard). High level of documentation plus audited evidence that the intended quality is being delivered to the customer (Terziovski et al., 2003).	3 types of Kaizen (Imai, 1986): 1) Management 2) Group 3) Individual categories 4 types of Kaizen activities (Brunet & New, 2003): a) Zero detect b) Policy deployment c) Small group activities (SGA) d) Suggestion scheme	Its ultimate goal is to achieve efficient production by minimizing waste or muda (Tapping et al., 2002, p. 1). The methodology is to maintain a continuous flow of products (just-in-time (JIT)) in factories in order to flexibly adjust to changes in demand to decrease costs, hence increasing productivity (Bhuiyan & Baghel, 2005)	Strategic process improvement, relies on statistical and scientific methods to make dramatic reductions in the defect rates (Linderman et al., 2003) focuses on reducing variation (Byuiyan & Baghel, 2005). Its key features are (Tague, 1995, p. 27): The use of data and statistical analysis Highly trained project leaders known as Black Belts and Green Belts.

Note. Summarized by the author from the literature review.

It can be observed that the QIs practices are overlapping with each other. However, each QI do emphasize certain areas to differentiate itself from another QIs. For example, lean emphasizes on value stream mapping and wastes reduction while Six Sigma emphasizes on reduction of variability and Six Sigma belt training regime. As for ISO 9001, it does focus on documentation, traceability and certification to legitimate the practices. These overlapping practices is expected since all the QIs are influencing each other with a long history series of development and change.

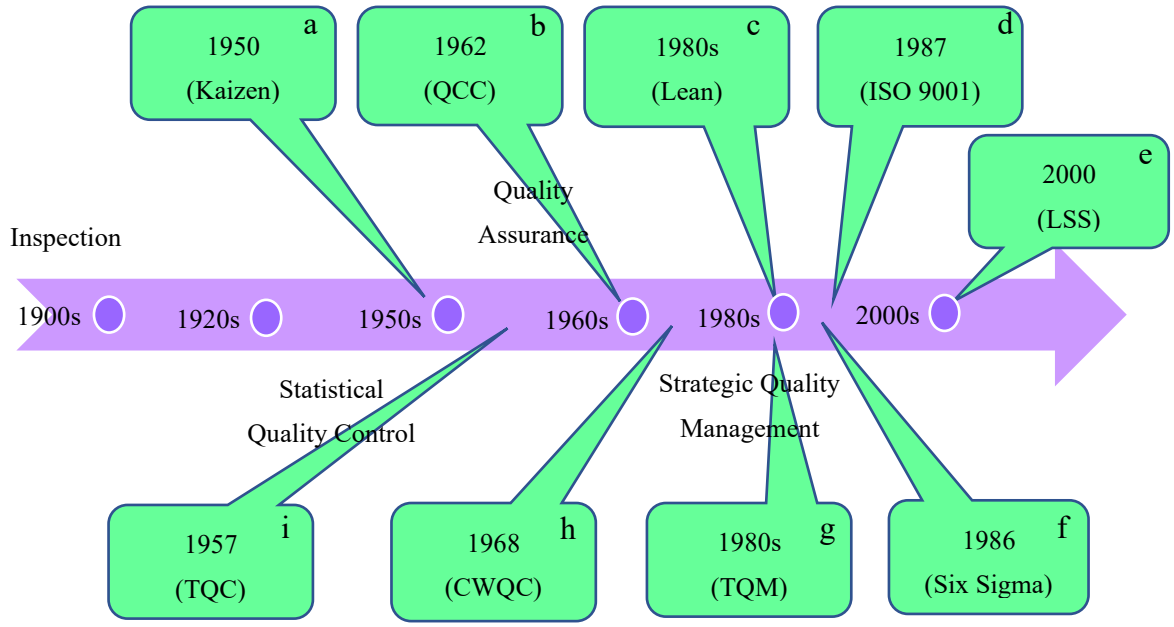
Figure 2.1 summarizes the history of the QIs development which was started from the 1900s. During the 1900s, the quality initiatives was more to detect then react and heavily depended on inspection process. Statistical quality control emerged around the 1920s which was equipped with prediction analysis, hence improvised the detection method. The quality initiatives started to receive attention from the 1950s, and thus stimulated the QIs development further.

Table 2. 2. *QIs Element (Hard and Soft Practices)*

No	Criteria	TQM	QM (ISO)	Lean	Kaizen	Six Sigma
Hard practices						
1	Statistical quality techniques analysis	✓	✓	✓	✓	✓
2	COQ	✓		✓		✓
3	Quality process control	✓	✓	✓	✓	✓
4	Statistical process control	✓		✓		✓
5	Reduction of variability	✓				✓
6	Quality information feedback and analysis	✓	✓	✓		✓
7	DMAIC					✓
8	DMADV					✓
9	Process management	✓	✓	✓		✓
10	Product design	✓	✓	✓		✓
11	VSM			✓	✓	
12	TPM			✓		
13	Waste reduction/elimination	✓	✓	✓	✓	✓
14	JIT and smooth flow			✓		
15	Pull system (i.e Kanban)			✓		
16	Zero defect				✓	
Soft practices						
1	Leadership and management commitment	✓	✓	✓	✓	✓
2	Management system	✓	✓	✓	✓	✓
3	Customer focus	✓	✓	✓	✓	✓
4	Employee training and development	✓	✓	✓	✓	✓
5	Certified training (yellow, green and black belt)					✓
6	Employee involvement	✓	✓	✓		✓
7	Employee empowerment,	✓		✓		✓
8	Employee suggestion scheme	✓		✓	✓	
9	CI	✓	✓	✓	✓	✓
10	Continuous innovation	✓	✓	✓	✓	✓
11	Teamwork	✓	✓	✓	✓	✓
12	Quality control circles/Project team	✓		✓	✓	✓
13	Cross functional teams	✓	✓	✓	✓	✓
14	Humanist change concept (i.e. culture)	✓	✓	✓	✓	
15	Quality function deployment	✓	✓	✓		✓
16	Policy deployment	✓	✓	✓	✓	✓
17	Benchmarking	✓				
18	Supplier quality management	✓	✓	✓		
Total criteria		25	18	28	15	24

Notes. Summarized by the author from the literature review.

Figure 2. 1. *History of QIs Development*



Note. Summarized by the author from the literature review.

a (Imai, 1986; Saleem et al., 2012), b (Ogawa, 2022), c (Womack et al., 2007), d (Boiral, 2011), e (Alnadi & McLaughlin, 2021), f (Montgomery & Woodall, 2008)., g (Dahlgaard-park et al., 2013), h and i ((Ishikawa, 1985).

Based on QIs history depicted in figure 2.1, Kaizen is considered among the pioneered QIs emerged in 1950s era. Then, TQC came into place in 1957 with Kaizen as the heart of the implementation. TQC then evolved to CWQC and finally to TQM (Dahlgaard-park et al., 2013). QCC is one of the essential practices for Japanese management system. Even though the QCC implementation rate declined after its peak period (1980s), the QCC activities still sustained because Japanese practitioners applied various mechanism, keep it flexible, continuously improve and evolve (Ogawa, 2022). Lean manufacturing was popularized in 1980s as a spinoff from TQM practices. Since Toyota was the pioneered of the Lean manufacturing practices, it can observe that most of the practices was edited and translated from TQM and idiosyncratic to fit Toyota practices. New practices such as just-in-time (JIT), TPM, value stream mapping (VSM) and Kanban system emerged. Once TQM popularized, western companies rapidly adopted TQM. However, some of the TQM elements were not successfully adopted. Among

the reasons is due to the different culture and values. American people are quite individualistic and result oriented compared to TQM which is more to collective value and soft practices. Hence, Six Sigma emerged to fill the TQM gaps with Motorola as the pioneered company.

Since Motorola is operated in electronics sector with rapid production output, reducing variability was the main objectives of the implementation. Belt training regime was introduced to cater and evaluate individual development as desired by American people. Last but not least is ISO 9001 which was introduced by ISO in 1987. Most of the ISO 9001 requirements are derived from TQM practices and sometimes people are assuming that ISO 9001 is equivalent to TQM. What makes the different is ISO 9001 is generated by ISO committees participated by various important entities from many countries. The ISO 9001 certificate introduced are amplifying the adoption rates since it served as an effective indicator to legitimate the QMS practices (Clougherty & Grajek, 2008).

2.3 Institutional Theory Overview

Social science mainstream study is basically to understand how socially constructed meaning systems influence social action (Berger & Luckmann, 1967). Institutional theory is originated from sociology and political science associated to the study on how external environment pressures affect certain organization decisions (DiMaggio & Powell, 1983) which has become a backbone of sociological theory. The new sociological institutionalism focused on institutional development, which lately attained rising attention and was considered among the powerful theories established that linked to organization studies (DiMaggio & Powell, 1983; Meyer & Rowan, 1977). Organizational theorists increasingly recognize the interrelationship between actions and institutions. However, organizational theorists' theoretical development and empirical research supporting the belief is far from perfection and still is considered in the early stage (Barley & Tolbert, 1997).

Berger and Luckmann (1967) stated that institutions were socially constructed action templates, created and sustained through constant interactions. Actors created institutions through past interaction accounts that led to general beliefs, expectations and interpretations of behavior, which overtime would be taken-for-granted, and therefore, shaped future interactions. Consequently, institutional studies main contribution is in exploring the interaction at the organization-level and field-level systems that influence both individual and organizational actions (DiMaggio & Powell, 1983). Selznick, 1957 stated that to institutionalize was "to infuse with value beyond the technical requirements of the task at hand". Therefore, institutional theory emphasizes heavily on the entrenchment process that has been described as "establishment of a practice, maintenance, cultural persistence, structuration, order or pattern, reproduction and retention" (Zeitz et al., 1999).

Furthermore, from the institutional theory perspective, organizational structure and adoption of ground-breaking practices, such as QIs, are mostly influenced by social aspects, commitment (Rogers et al., 2007) and "preconscious acceptance" of the principles (Yeung et al., 2011). Organizations created certain practices ceremonially to prioritize stakeholders (Buysse & Verbeke, 2003) and obtained legitimacy, while casting down and eventually supplanting the operational efficiency value (Delmas & Montes-Sancho, 2010; DiMaggio & Powell, 1983; Rogers et al., 2007), as symbolic practices would unlikely improve the organizations' performance. Complying with institutionalized rules that lead to increasing organizations' legitimacy (e.g., image and external organization) might also help the initiated actors garner credibility, and therefore, increasing personal legitimacy internally (Yeung et al., 2011). Actors improved their legitimacy by acting as "moral entrepreneurs", championing and demonstrating social connections (Elsbach, 1994).

The implementation of QIs is considered reaching institutionalization if it is embedded in the system and becomes the expected way of performing the practices, and it also enables organizations to gain legitimacy (Westphal et al. 1997). Moreover, it can be anticipated that institutions and institutional norms eventually emerge in the maturing of a particular industry (Gopal et al., 2005).

2.3.1 Institution

There are various institution definitions described from several authors' perspectives. (Barley & Tolbert, 1997) defined institutions as "shared rules and typification that identify categories of social actors and their appropriate activities or relationships", while North (1990) relate institution as rules of games that influence human interaction. Jepperson (1991, p. 145) emphasized the material state of institutions, as socially constructed, routine-reproduced and integrated with program or rule systems. This view was supported by other authors, such as Scott (2001), who defined institution as standardized interaction sequences that have attained a certain state or property and are highly resilience, which in consequence can constrain or empower actors (Scott, 2001; Gupta et al., 2020) and owe their survival to relatively self-activating social processes (Lawrence et al., 2002). In addition to that, Weik (2019) further explained that institutions as dynamic processual arrangements may involved actors in the processes but it is not the main factor to enable sustainability.

Barley and Tolbert (1997) interestingly related institution as "abstract algebras of relations among members of social sets" and equated "institutions are to social actions as grammars are to speech". They elaborated in detail that people are able to speak freely, but they need to adapt to tacitly understood rules to ensure that the listeners could comprehend the speeches. Similarly, institutions are accumulation of past practices, whereby creating some basic rules and understanding on actions. Therefore, social actions seem to vary in many ways, but the actions taken are meeting the taken-for-granted assumptions about the appropriate manners in certain time and conditions.

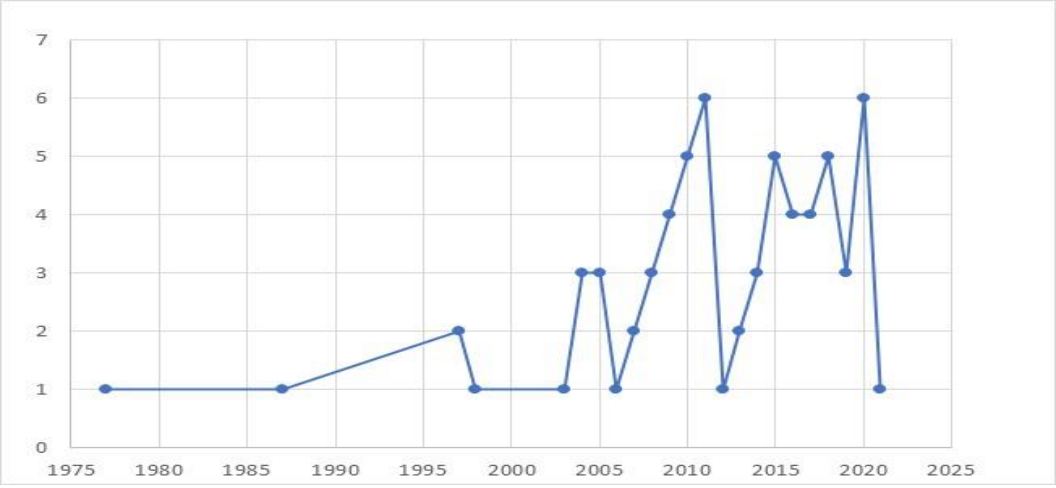
Based on the aforesaid definitions, it could be concluded that institutions are both material and symbolic (Friedland & Alford, 1991) or in other words, institutions consist of hard (e.g., technical) and soft (e.g., legitimacy) aspects. Material aspects are related to material patterns of individuals or organizations in maintaining their survival through routine reproduce over time and space (Friedland & Alford, 1991). As for the symbolic aspects, material practices are supported with concepts and rhetorical in order to provide value and legitimacy (Strang & Meyer, 1994). This notion was supported by (Green et al., 2009) who stated that cognitive

legitimacy was influenced by rhetorical through the belief systems that provided certain tacit rules influencing the actors' actions, which is known as institutional logics.

2.3.2 QIs from Institutional Theory – Publication Trend

From the critical review conducted, this section discusses the key findings in terms of publication trends and QIs research themes that were identified from relevant institutional theory research conducted in the manufacturing industry. Figure 2.2 depicts the number of publications related to QIs implementation from institutional theory perspectives in manufacturing industry between 1975 and 2021. The institutional theory research in manufacturing industries started to have a growing trend since 2004. However, it could be observed that there was more than 25 years of lagging before the research started to get attention in the manufacturing industry. This trend was expected, since early studies of QIs implementation were more focused on technical aspects. Besides, the institutional theory main research was more focused on the general sector. Conversely, various authors started to highlight the importance of symbolic aspects in early 20th century, which might lead to the growing trend of the QIs implementation research from institutional theory perspectives (Cameron & Sine, 1999; Recht & Wilderom, 1998).

Figure 2. 2. *Number of Publications Related to QIs from Institutional Theory Perspective in Manufacturing Industry Between 1975-2021*



Note. Analyzed by the author from the literature review.

Table 2.3 shows the list of QIs research conducted based on institutional theory theme in manufacturing industry. In early 1980s and 1990s, studies were focused on institutional pressures, legitimacy and cultural aspects. Thereafter, from 2000 onwards the focus shifted to the contextual aspects of QIs practices and institutionalization. It could be observed that motivation, institutional work and institutional logics studies rapidly emerged after 2005. This indicated that the research interest shifted from understanding the institutional pressures, culture and legitimacy effect into understanding the process of institutionalization and recently into understanding the convergence and divergence of the practices. However, these studies are far from comprehensive in numbers compared to hard or technical study of QIs implementation and performance perspective. Therefore, there is a need to further study QIs, in terms of institutional theory perspectives soft aspects.

Table 2. 3. *List of QIs Research Conducted Based on Institutional Theory Theme in Manufacturing Industry*

No.	Category	Authors
1.	Organizational environment	Ebrahimi and Koh (2021), Gupta et al. (2020), Ng and Hempel (2020), Rentizelas et al. (2020), Cadden et al. (2020), Sinha and Dhall (2020), Caldera et al. (2019), Kalyar et al. (2019), Adebanjo et al. (2018), Dubey et al. (2018), Turkulainen et al. (2017), Gamage and Gooneratne (2017), Wijethilake et al. (2017), Georgiev and Ohtaki (2016), Adebanjo et al. (2016), Dubey et al. (2015), Zimmermann and Bollbach (2015), Ahmad et al. (2014), Peter J. and Diana (2014), Zhu et al. (2013), Aoki and Lennerfors (2013), Hofer et al. (2011), Huang et al. (2010), (Moore and Rees (2008), Rogers et al. (2007), Zsidisin et al. (2005), Beck and Walgenbach (2005), Mueller and Carter (2005), Naveh and Erez (2004), Ketokivi and Schroeder (2004), (Perry et al. (1997), Oliver (1997), Scott (1987) and Meyer and Rowan (1977).
2.	Motivation	Tzeng (2018), Rolfsen and Johansen (2014), Braunscheidel et al. (2011), Nair and Prajogo (2009) and Martínez-Costa et al. (2008), and Yeung et al. (2006).
3.	Institutionalization	Weik (2019), Lo and Yeung (2018), Yeung et al. (2011), Green Jr. et al. (2009) and Cooney and Sohal (2004).
4.	Institutional work	Lounsbury and Boxenbaum (2013), Willmott (2015), Lawrence et al. (2011), Rocha and Granerud (2011), Tracey et al. (2011), Pacheco et al. (2010), Bruton et al. (2010) and Phillips et al. (2009), and Lawrence et al. (2009).
5.	Institutional logics	Vidal (2017), Reay and Jones (2016) and Greenwood et al. (2010).
6.	Convergence/Divergence practices	Choi and Eboch (1998), Sandholtz (2012) and Narasimhan and Nair, 2015.

Note. Summarized by the author from the literature review.

According to institutional organizational theory, the adoption of new practices, such as QM, is subject to competitive and institutional effects (Yeung et al., 2006). Institutional theory is appropriate in capturing the external pressures imposed in influencing manufacturing companies' actions related to QIs implementation. Therefore, it has become a significant research interest in the understanding of QIs implementation (Ketokivi & Schroeder, 2004). Sturdy (2004) proposed that the decision to implement certain QIs was based on rational and less rational factors, such as the current trends, impulse, persuasion, power (regulation), or culture.

Based on the articles identified, six main research themes were categorized. Figure 2.4 shows the number of publications based on the research theme. Since the focus of institutional theory is to understand the organizational environmental effect in influencing organization decisions and actions, most of the studies conducted (36 articles) were on organizational environment area. The second most studied theme was motivation (10 articles), followed by institutional work, institutionalization, institutional logics, and convergence/divergence practices. The following section discusses in detail the summarized theories relevant to each research question.

Figure 2. 3. *Number of Publications Based on Research Theme*

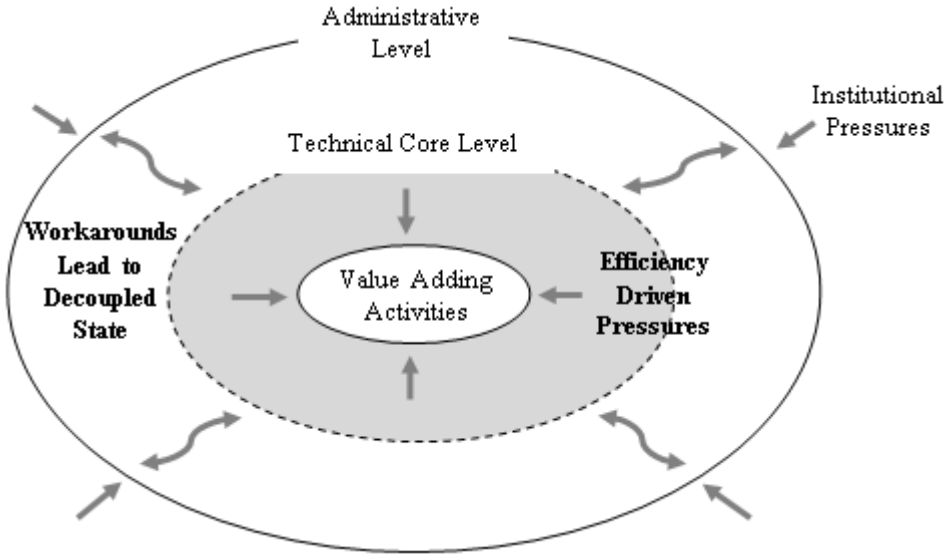
Note. Analyzed by the author from the literature review.

2.4 QIs Convergence and Divergence Practices

There are three usual approaches related to social orders: standards, directives, and norms (Sandholtz, 2012) involved in the implementation process. However, institutional norms, principles, and rules are frequently contradicting with each other. Thus, the implementation may generate internal pressures as organizations need to maintain their core practices from the external interference (Malmmose & Kure, 2020). According to Meyer and Rowan (1977), there is a clear distinction between organizations' technical core practices and their administrative procedures. However, Malmmose and Kure (2020) modified the assumption as the boundaries between those two are more blurred in practice, indicating that core practices may change over time. Organizations may implement the decoupling strategy due to the strong coupling of the former logic (Meyer & Rowan, 1977) or on the other hand, managed to tightly couple to the new emerging institutional logic (Sandholtz, 2012).

There were various discussions related to the persistence of heterogeneity in the face of institutional isomorphism (Sandholtz, 2012). Consequently, institutional theorists introduced the decoupling theory to further clarify the organization level implementation of QIs (Choi & Eboch, 1998). Empirical evidence of decoupling has been highlighted in various fields, such as organization studies and operation management (Bhakoo & Choi, 2013). For example, Meyer and Rowan (1977) introduced the decoupling strategy conferring the actions taken by organizations in response to institutional pressures. A ceremonial show is among the organization’s responses in shielding institutional pressures, while maintaining the status-quo of technical practices (Meyer & Rowan, 1977; Sandholtz, 2012)The view was supported by others (Bhakoo & Choi, 2013; Buysse & Verbeke, 2003; Delmas & Montes-Sancho, 2010), who stated that manufacturing companies adopted decoupling strategies that would enable them to take into account stakeholders’ concerns and comply with the government’s rules and regulations, without much changes to their technical core practices. In addition, Bhakoo and Choi (2013) illustrates the organizational response toward endogenous and exogenous (institutional) pressures as shown in figure 2.4.

Figure 2. 4. *Organizational Response to Institutional and Endogenous Pressures*



Note. Adapted from Bhako and Choi (2013).

Several standardization researchers denoted that standards were abstractions, which required local actors' translation and adjustment prior to the implementation (Timmermans & Epstein, 2010; Sandholtz, 2012). Thévenot (2009, p. 810) ridiculed that standardization aimed in achieving uniformity across time and space, as impractical and 'impossible' to accomplish.

Power dynamics has been identified as an important variable that mediates the desire to decouple and the action of decoupling. Decoupling occurred more frequently when top executives had power over boards to resist external pressure for changes (Boxenbaum & Jonsson, 2008, p. 87). However, Barley and Tolbert (1997)suggested that "the decoupling of formal structures and actions was apt to be rare and relatively short lived." Additionally, Sandholtz (2012) demonstrated three types of coupling: malignant decoupling, benign decoupling and tight coupling. He emphasized that tight coupling would be successfully guaranteed if the internalization precedes standardization.

For example, ISO certification is considered as a soft law since there will be no sanctioned or penalty if a company decided not to implement the standard. Based on previous research findings, the QI effectiveness was the main reason that inspired early adopters to implement QI. However, late adopters are more likely to be bending to institutional pressures (Tolbert & Zucker, 1983; Zbaracki, 1998; Sherer & Lee, 2002). It is expected that a late-adopter seeks the certification simply due to mimetic pressure and to gain legitimacy than out of conviction that the standard is able to improve performance (Boiral, 2003; Westphal et al., 1997; Zbaracki, 1998)Therefore, the implementation becomes ceremonial and superficial, and thus, decoupled from the technical core of the organization (Meyer & Rowan, 1977). This view was supported by other researchers emphasizing the findings that ISO 9001 showed rampant decoupling of compliance-driven work (Zbaracki, 1998).

Companies implementing ISO 9001 are supposed to gain several advantages and improve their competitive edge (Cole, 1999). Barney (1986) pointed out that companies were able to demonstrate their competitive advantage due to distinct heterogeneity factors. However, the more widespread ISO 9001 adoption, the less advantages and lower opportunity for companies to differentiate themselves from competitors due to the effect of ISO 9001 quality management homogeneity and leverage. Consequently, the fact that ISO 9001 is a beneficial QI is increasingly questionable, especially from the prospective of competitive edge (Naveh and Marcus, 2005).

Sandholtz (2012) stated that for a standard to be put into practice, it should cross two crucial social boundaries, which were between the organizational field and the organization, and subsequently between the organization and the affected technical or functional subunit, with its own occupational norms and subculture. Based on his research on two divisions of the same corporation, which were certified with ISO 9001, but with different outcomes: decoupled and tightly coupled practices due to the norms and practices of the existing occupational (engineers) receiving end confrontation. Therefore, these studies supported the view that technical core is most likely to remain the same if the certification practices are implemented ceremonially (Zbaracki, 1998; Boiral, 2003).

A few researchers argued that convergence mostly occurred to macro-level aspects (e.g., structure and technology), whereas divergence occurred more to micro-level aspects (e.g., individual behavior). For example, Sila and Walczak (2017) found that convergence mostly happened for overall TQM practices with some divergence for a few TQM practices. Hackman and Wageman (1995) highlighted that there was scant evidence that organizations implement the TQM programs entirely as per the TQM actual work principles. The organizations' goal of implementing this TQM programs is to demonstrate that they are implementing certain practices in building legitimacy due to strong social and commercial pressures instead of striving for efficiency, which often lead to language and rhetoric games in organizations (Cole, 1999; Zbaracki, 1998). Most organizations that implemented TQM programs developed an "ideal organizational identity" (Reger et al., 1994, p. 574) but the image projected was often fairly different from the daily activities and its technical core (Dutton & Dukerich, 1991). This point of view was supported by Soltani and Wilkinson (2010), who stated that middle managers need to align their actions consistent with senior management's behavior instead of to adhere with TQM principles.

Jung (2008) examined how TQM, as a normative control discourse and business process reengineering (BPR), which a techno-structural discourse influenced each other's organizational control perceptions. Initially, TQM and BPR began with unique principles and definitional framing. However, from the study, it was found that TQM and BPR definitional framing moved towards convergence in line with the increasing popularity of the rival discourse. TQM framing became more techno-structural, while BPR framing became more normative. Therefore, both logics gradually lost their original identities. The convergence pattern involves both cognitive and strategic manipulation of meanings process to endure the pressure of the rival discourse.

Beckert (2010) discussed in length the factors which steered institution either to convergence or divergence. For example, the institutional changes might tend to implement homogenous practices if there is a strong external driving force, most of the institutional entrepreneurs agree with the practices, legitimacy of the institutional practices and direct competitive pressures. In contrast, these factors might lead to divergence of practices, such as influential guardian of the original institutional rules, equivocal opinion among actors, the desire in institutional distinction, lack of practices legitimacy and differentiated products.

2.5 QIs Institutionalization

Previous research on diffusion from institutional theory perspective suggested that early adopters emphasized on technical aspects, while late adopters were more concerned on legitimacy (DelliFraine & Langabeer, 2009) and the institutional pressure was increasingly stronger over adoption time (Tolbert & Zucker, 1983). The two-stage model (DiMaggio & Powell, 1983; Tolbert & Zucker, 1983) theorized that the adoption driving force shifted from technical rationality adoption motivation to the practice's legitimacy. Love and Cebon (2008) improvised and re-conceptualized that technical rationality adoption motivation was present throughout the diffusion stage, but the perceptions of what was rational or effective shifted from the organization-level meaning system towards the field-level meaning system. The study findings supported the views that the adoption decision at the early stage of diffusion was mainly influenced by the organizational-level meaning systems. However, that influence decreases as diffusion spread. This pattern is consistent with imitation, theorization and institutionalization processes (Love & Cebon, 2008) and in comparison with Czarniawska and Joerges (1996) model of the disembedding and re-embedding, which include editing and translation processes of sense-making practices. As the practices diffused, the field-level meanings come to be increasingly attached to the practices and suppressed the organizational-level meaning system's influence on adoption during the re-embedding process.

David and Strang (2006) analyzed the TQM consulting firms' characteristics and dynamics during and after the TQM fashion boom. They likened the TQM's development as a "fashion circle," with the preboom (1982–88), boom (1989–1993) and bust eras (1994 onwards). Adoption during the preboom era could be considered similar to the rational adoption period, as most of the early adopters were from large manufacturing companies with technical capabilities, while the education and knowledge transfer was dominated by prominent quality "gurus" such as Crosby, Deming and Juran. This combination increased the likelihood for companies to achieve tremendous benefits. In the boom period, most adopters tended to adopt superficial implementation in the effort to build legitimacy, regardless of its performance benefits (Tolbert & Zucker, 1983; Westphal et al., 1997). Adopters refocused the TQM practices to technical aspects after the fashion bust with quality control expertise came to dominate TQM consulting. The discourse of TQM declined, but the quality par increased and companies were apparently able to manage quality well (Cole, 1999). Therefore, it could be concluded that the TQM institutional trajectory shifted from rational to ceremonial to rational.

Zeitz et al. (1999) mentioned that two stages of organizations' management practices are initial adoption and institutional entrenchment whereby diffusion theory enlightens organizations 'adoption practices but fails to explain matters related to the preservation and entrenchment of the practices while in contrast, institutional theory covers both stages but focuses more on the entrenchment practices. Institutionalization refers to the social construction process, in which certain practices become imbue with value (Dubey et al., 2015) and taken-for-granted (Selznick, 1996; Tolbert & Zucker, 1983). A practice is considered institutionalized when it is embedded with the organization's system and able to sustain and remain unchanged despite receiving endogenous and exogenous pressures (Gonzalez, 2011). From the institutional theorists (DiMaggio & Powell, 1983; Meyer & Rowan, 1977) point of view, the institutionalization of organizational systems often sacrificed efficiency criteria, leading to unintended consequences. Three primary carriers of institutionalization are formal organizations, regimes (institutionalization in some central authority systems) and culture (Jepperson, 1991, p. 150).

Past research revealed that the time of adoption would affect the level of institutionalization of a certain practice (Tolbert & Zucker, 1983). Yang et al. (2021) pointed out that the rate of institutionalization of certain practices varies depending partially on duration of the established institution and the degree of acceptance by collective members. Institutions that are having short duration and low degree of acceptance are more exposed to queries and difficult to influence actions. Therefore, Green et al. (2009) proposed a rhetorical model of institutionalization to gauge the institutionalization development. A certain practice is considered institutionalized when the arguments collapse from syllogisms into enthymemes and finally into claims.

Green et al. (2009) conducted a study on how TQM institutionalized from rhetorical theory perspective based on syllogistic logic and the Toulmin's model, specifically focusing on change in the argument structure. Moreover, from the findings, TQM accounted for the early stage rhetorically that made sense on the suitability of TQM (Zbaracki, 1998) and created new logics (claim) that redefined the established institutional logics (major premise) and meanings (Figure 2.5). The major premise and minor premise were suppressed respectively, and finally the TQM was considered institutionalized, as the arguments collapsed from syllogisms into enthymemes and finally into claims. Rationalizing and making sense of TQM practices requires TQM discourse. Therefore, it requires actors as agency to define, infer and resolve the problems to demonstrate the appropriateness and benefits of TQM implementation.

Figure 2. 5. *TQM Argument Structure and Institutionalization*

Syllogism	Enthymeme	Claim	
Minor Premise (Quality is negatively related to waste)	Minor Premise (Quality is negatively related to waste)	Minor Premise (Suppressed) (Quality is negatively related to waste)	New Major Premise (Quality is negatively related to costs)
Major Premise (Waste is positively related to costs)	Major Premise (Suppressed) (Waste is positively related to costs)	Major Premise (Suppressed) (Waste is positively related to costs)	
Claim (Quality is negatively related to costs) →	Claim (Quality is negatively related to costs) →	Claim (Quality is negatively related to costs)	

Note. Adapted from Green et al., 2009

Another example is a study conducted by Cooney and Sohal (2004) in terms of relationship between QI program development and teamwork development, hence gauge the teamwork institutionalization within Australian manufacturing companies. After some initial experimentation, companies seemed to settle upon a set of practices that became institutionalized, but equipped with the institutional stretch ability, which management utilized their "interpretative viability" to restructure the teamwork practices to fit with the new tasks and practices. Many companies went beyond TQM and adopted various improvement programs, however, the TQM teamwork practices were sustained.

Lo and Yeung (2018) conducted a longitudinal study on the implication of institutionalization of quality management standards in the U.S. manufacturing companies. Their findings challenged predominant viewpoints that manufacturing companies, which operated in a highly technical environment faced minimum institutional pressures (Oliver, 1997). Besides, the research result demonstrated that even though institutionalization of ISO 9001 increased sales revenue, it did not improve the market value (Tobin's q) of a manufacturing company. This indicated that the ISO 9001 standard was institutionalized and served as a symbol for quality management and operational legitimacy. Customers tend to select certified ISO suppliers, but ISO 9001 certification does not influence investors' decisions. This may be due to different sources of organizational legitimacy (Dacin et al., 2007). In conclusion, ISO 9001 influenced market legitimacy, but not investment legitimacy. The research findings also discussed about paradoxical result, whereby the top management compensation was increased along with the decreased of operational performance. Top management of certified ISO 9001 companies were viewed as the legitimate leaders and positively appraised by the stakeholders.

The degree of institutionalization had been discussed in detail by Zeitz et al. (1999). The authors characterized institutionalization as formally gazetted, compatible with other embedded practices, closely linked with organizational image, backed up by theory and coupled with the organization's basic implementation and analysis level. In line with that, they proposed five bases of mechanisms for the adoption and entrenchment of a given practice

(Table 2.4): models (mimetic pressure), cultural entrenchment (beliefs and values), education and indoctrination (normative pressure), regulative (coercive pressure) and technical-rational (benefits). Models (mimetic pressure) is closely related to the diffusion process whereby adopters imitate their near-peers' experiences as the result from the interaction network between the adopter organization and the modelled organizations. Cultural entrenchment, and education are associated with normative and cognitive elements. Cultural entrenchment linked to organizational members' norms, beliefs and values while education is a transmission process that occurs via formal education system. As for regulative, the coercive pressures may be originated from government, powerful agents such as large firms or certification bodies, and also societal values. Technical-rational bases is related to actors perception of the positive benefits and performance outcomes which will enhance the organization's commitment to the adopted practice.

Table 2. 4. *Adoption/Entrenchment Bases: Mechanisms and Resources*

Basis	Definition	Principle mechanism	Principle Resource	Principle Focus
Models	Imitation by one actor of perceived practices displayed by others	Imitative propensity; network ties	Pre-existing models	Adoption
Culture	The existence of values and beliefs that are matched by important cognitive and normative propensities of actors	Desire for acceptance: self-identity formation	Beliefs and values	Entrenchment
Education	The transmission of beliefs, values and technical information by specific means including trained instructors, a body of knowledge, instructional materials, and site for activity	Imitative propensity; bounded reality	Knowledge, materials, locations, roles	Entrenchment
Regulative	Constraint apply by one actor on another, either positive or negative, and consisting of legal sanctions or withholding important resources	Power and resources, sunk costs	Self-interest	Adoption and entrenchment
Technical	Specific efforts to measure and evaluate responsiveness to need or contribution to performance	Bounded reality	Rewards for efficiency	Adoption and entrenchment

Note. Adapted from Zeitz et al. (1999).

It is expected that once there is a large number of supporting elements based on the five bases mechanisms, the practice become natural and 'taken for granted' hence institutionally entrenched. However, the number of supporting elements based on the five bases mechanism alone is insufficient indicator of institutionalization. Beside the number of bases, Zeitz et al. (1999) further proposed five qualitative dimensions to assess the degree of institutionalization (Table 2.5): compatibility (fit and consistent with system value and belief), formalization (written down in official documents), depth, (deeply embedded with cognitive/value structure, systemic coherence (presence of coherent and articulated blueprint), and amount of interdependency (interconnected between different levels).

Table 2. 5. *Adoption-entrenchment Continuum: Dimensions of Qualitative Differences*

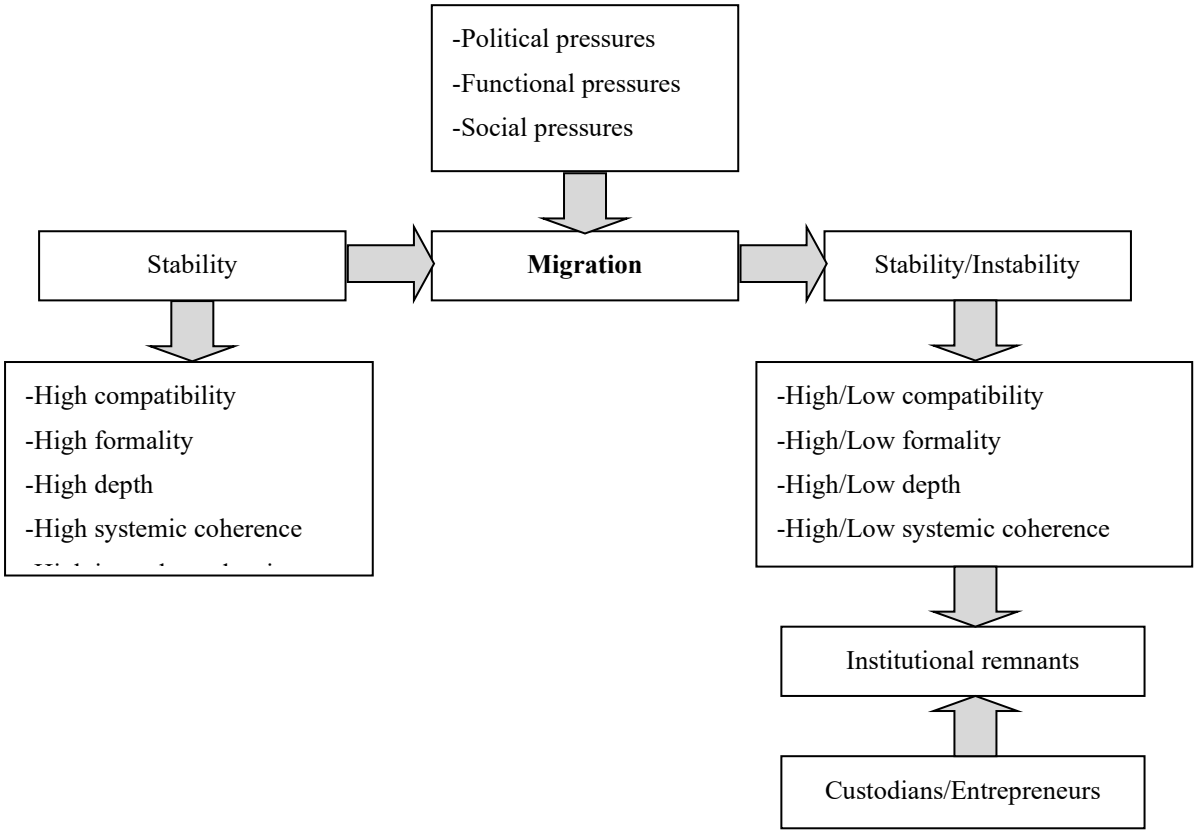
Dimension	Type of Process (Zeitz et al., 1999)		TQM institutionalization (adapted from Gonzalez, 2011)
	Adoption	Entrenchment	
Number	Few different bases. Few elements within each base.	Many different bases. Many elements within each base.	
Compatibility	Little fit with other practices or with larger values and beliefs	Practices fits into a related cluster of practices and is consistent with larger system beliefs and value	TQM is compatible with other organizational practices and adopted in all functional areas
Formality	Emphasis on face-to-face, spontaneous, and serendipitous communication	Models, rules values become written down in official documents	TQM is highly formalized (quality plan, quality guidelines and principles, and quality procedures and manuals). There are formal organizational structure. Organization participated in formal quality associations
Depth	Practices are mere external behaviours recognized as 'fads'	Practices are deeply embedded within cognitive/value structure and begin to implicit assumptions.	The TQM is highly embedded within the values and organizational processes and become part of everyday life and taken for granted
Systemic Coherence	Each part operates without knowledge of the other	There is a coherent, well-articulated blueprint for the practice	TQM had very strong foundation and widely promoted by powerful institutions and individuals
Interdependency	Different levels and bases are unconnected and haphazard, often at cross-purpose	Different levels bases are interconnected, the successful operation of one depends on the successful operation of the other.	The degree of TQM development and acceptance across boundaries (individual, organizational, inter-organizational and societal)

Note. Summarized from Zeitz et al. (1999) and Gonzalez (2011)

Higher compatibility with other institutionalized practices resulting higher chances for the practices to be accepted and institutionalized. As for formalization, written rules assist the practice sustainability since it improves the 'retrievability' of a practice and its chances of continued use. Four formalization methods are formal policies, contracts, associations, and specialized personnel. The depth is closely related to cultural basis of entrenchment in organization members' cognitive and value structures which influence the members perception and orientation. As for systemic coherence, the practice institutionalization is increased when the practice is supported by a well-articulated theory or ideology which may available in administrative documents, manuals or academic research reports. Greater level of institutionalization transpires when practices interdependencies advance across levels and across support bases. For example, TQM practices were mutually reinforced internally within organization and externally by several powerful quality awarding bodies and the Spanish government (Gonzalez, 2011).

In contrast to institutionalization, there were a few pressures that able to influence the instability or lead to failure or de-institutionalization of institutionalized practices, such as political, functional, and social pressures (Oliver, 1992). It is not likely for institutionalized practices to be dissolved entirely. Based on this assumption, Gonzalez (2011) suggested the ideas of institutional remnants and custodians/entrepreneurs as illustrated in the theoretical migration framework in Figure 2.6.

Figure 2. 6. *Theoretical Migration Framework*



Note. From Gonzalez (2011)

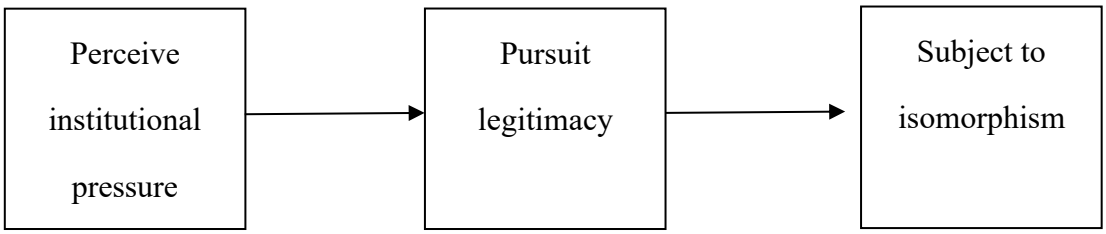
2.6 QIs Dissemination

There are four institutional theory research themes that are considered relevant in QIs dissemination research: organizational environment, motivation, institutional work, and institutional logics. Organization environment is related to the institutional pressures imposed in the manufacturing environment while motivation focuses more on the driving force that motivates an organization to implement certain QIs. As for institutional work, the research emphasized on the role of actors. Institutional logics is considered relevant as well considering the fact that manufacturing environment is complex, hence there is a high possibility that multiple institutional logics exist.

2.6.1 Organizational Environment

The institutional theory fundamental concept is organizational isomorphism, which has been recognized by many researchers (Heugens & Lander, 2009). This theory advocates the notion that similar institutional pressures will influence organizations in the organizational field to mimic and adopt similar structures and processes (DiMaggio & Powell, 1983), and therefore, stimulate isomorphic practices (figure 2.7). Individual or organization have cognitive ability to infer "the way things are and/or the way things are to be done" (Scott, 1987, p. 496). These cultural elements influence the individual or organization to implement certain practices to conform to the organizational field's "cult of reason" (Meyer & Rowan, 1977) out of a concern for the organization's legitimacy (Boiral, 2003). Therefore, they are confined in the iron cage of psychic prisons (Klagge, 1997) or "suspended in a web of values, norms, rules, beliefs and taken-for-granted assumptions", somewhat in part created by their own (Barley & Tolbert, 1997, p. 93). The institutional pressures developed from strong norms and beliefs may be originated from rules and regulations, public opinion, important stakeholders, such as customers and suppliers, professionalization received from education agencies and social status (Yeung et al., 2011). Consequently, to understand the process of institutional isomorphic change in organizations is the main research agenda for institutional theorists (Braunscheidel et al., 2011).

Figure 2. 7. *Institutional Theory Based on Di Maggio and Powell (1983)*



Note. From Leung et al. (2018)

The imposed institutional pressures will shape and influence the organizational environment. There are three types of institutional isomorphic change mechanism, which include mimesis (mimetic), power (coercive) and attraction (normative). These institutional pressures are independently or interdependently affecting direction of organizations change and lead to isomorphism (DiMaggio & Powell, 1983; Braunscheidel et al., 2011). These three pressures can also be considered in terms of topographical directions from where isomorphic pressures emanate in an organizational field: regulative pressures normally come from above (the state), whereas mimetic and normative pressures often stem from horizontally positioned peer organizations or grouping. These institutional pressures in general impose threats to the organization's legitimacy or contribute variable for uncertainty (DiMaggio & Powell, 1983). Strang and Soule (1998) associated the three pressures to a mapping of diffusion channels in terms of external diffusion pressure on the organization, such as state, peer across firms, or internal diffusion pressure from professional information networks (Boxenbaum & Jonsson, 2008, p. 80). Prior literature proposed that practices were influenced by institutional pressures from the local home country. However, as the business boundaries continue to expand internationally, it is also expected that additional institutional pressure is imposed by the international organization host country (Yang et al., 2020). Beckert, J. (2010) added another institutional pressure, which is competition. Identifying these pressures enables organizations to minimize the QIs implementation failures.

Mimetic isomorphism happens when firms imitate the actions of successful competitors in the industry (Rowley & Bae, 2002). Mimetic pressures in "role-equivalent trade relationship" (Guler et al., 2002, p. 207) influence organizations to imitate other organizations' practices when they face high uncertainty and turbulent environment, whereby it is difficult for them to foresee the outcomes (DiMaggio & Powell, 1983), such as in a new emerging technology implementation. Organizations are very likely to benchmark and follow their main competitors' successful practices (DiMaggio & Powell, 1983) or "their near-peers experience" (Zeitz et al., 1999) that are perceived to be successful or influential. Moreover, even though it might not be

a perfect choice (Heugens & Lander, 2009), they perceived that the practices were indeed progressive and desirable to hedge the risks and increase legitimacy (Liu et al., 2010).

As for coercive pressures, the pressures originated from those in power (e.g., customer, supplier or regulator), who are able to influence the organization's decisions or actions (Dora et al., 2013) either formally or informally and by cultural expectations in the society within the organization's environment (DiMaggio & Powell, 1983). Coercive pressures often originated from regulatory agencies, such as the government, organization headquarters and partners (DiMaggio & Powell, 1983). Coercive pressures result from power relationship and politics: prototypically these are the demand from state or other large actors to adopt specific structures or practices, or else face sanctions (Scott, 2008). For example, mandated rules and regulations from the government for manufacturing companies to produce products free from the restriction of hazardous substances (RoHS) and registration, evaluation, authorization and restriction of chemicals (REACH) substances, or mandatory hazard analysis critical control points (HACCP) compliance for food industries (Dora et al., 2013). Furthermore, the large main customers demanded manufacturing companies to adapt and implement Six Sigma program and headquarters requested subsidiaries to implement similar quality control circle (QCC) improvement activity. Those requests were inevitable and coercive manufacturing companies to implement the practices in similar manner. Coercive pressures from the government rules and regulations might bring negative impacts, reducing the effectiveness of QIs program (Barratt & Choi, 2007) and work against normative pressures (Shi et al., 2018).

Normative pressures originated from professionalization, which makes organizations conduct and behave based on their professional network expectations (DiMaggio & Powell, 1983). These pressures usually originated from partners, accreditation bodies, professional associations (Bhakoo & Choi, 2013), customers and supply chains (Khalifa & Davison, 2006). Normative pressures increase when certain practices are expected to be implemented due to social obligations (DiMaggio & Powell, 1983). These pressures are disseminated via various methods, such as hiring licensed or qualified people (DiMaggio & Powell, 1983) using similar

technology or implementing practices recognized by community in the field (Zhu & Sarkis, 2007).

Early study of various authors demonstrated that TQM and JIT implementation were due to the institutional pressures. For example, Dean and Snell (1996) explained that both QIs are institutionalized in North American and Western European manufacturing industry motivated by the fact that managers experience substantial pressure to join the bandwagon of TQM and JIT even it was not strategically related. Another example is a study conducted by Dubey et al. (2018) related to the extent of institutional pressures influence TQM diffusion through top management commitment. The study findings demonstrated that institutional pressures (i.e. coercive normative and mimetic) and TMC as strong predictors of TQM diffusion. However, the control variable which is organization size were found not significant for acceptance, routinization and assimilation measured in the model.

Dora et al. (2013) conducted a LM study in the European small and medium-sized enterprises (SMEs) food industry. The study findings showed that LM in the food industry was still at an early stage of development. Manufacturing companies primarily focus on food safety and quality assurance, instead of process improvement. Due to the fact that the government imposes strict quality assurance rules and regulations and customers often demands for quality certifications. It could be concluded that QIs in food industry is having institutional coercive isomorphism as dominant pressure compared to normative or mimetic isomorphism.

As for competitive pressure, theories related to competition pressures lead to the institutional isomorphism of organizations while assuming that institutional inefficient practices are eliminated (Beckert, 2010). From neoclassical economic theory perspective, organizations may tend to implement similar practices due to competition pressures. Based on transaction-cost economics, there will be hierarchies and networks, but transaction costs will influence its basic structure (Williamson, 1993, p. 88). It will lead organizations to adopt an optimal institutional structure that minimizes such costs, hence leading to convergence practices. However, social scientists argued that competition leads to divergence, which received much influence from Charles Darwin's evolution theory.

2.6.2 Motivation

Antecedent studies typically distinguish the driving forces into two categories: endogenous (internal) and exogenous (external) motivation. Driving forces from endogenous motivation are closely related with resource-based view (Barney, 1991) to resolve internal pressures, such as to improve process and product quality and hence, increasing productivity (Marimon et al., 2019) and strengthening capabilities for a better competitive edge (Martínez-Costa et al., 2008). As for exogenous motivation, its main purpose is to resolve external pressures, such as to meet customers' demand, comply to government gazetted directives to avoid infractions (Bansai, 2005), and to enhance their image and social legitimacy (Marimon et al., 2019). For example, Hoque and Alam's (1999) study discovered that TQM is adopted to encourage institutional and quality culture through the influence of important exogenous factors, such as market pressures, competition, customer expectations, and professional associations. Thus, exogenous motivation is consistent with institutional theory (e.g., DiMaggio & Powell, 1983), which states that the decision to implement related QIs is influenced by those three isomorphic institutional pressures (Martinez-Costa et al., 2008).

There are two paradox assumptions in viewing the QIs driving forces: the rational actor model to pursue efficiency (Kennedy & Fiss, 2009; Teece, 1980) and the social obligation to pursue legitimacy (DiMaggio & Powell, 1983), which has appealed economists and sociologists for the latter case. Tolbert and Zucker's (1983) enlightened the literature by their two models of the QIs diffusion driving force, with the argument that early QIs adopters emphasis heavily on technical efficiency, whereas later adopters focus more on legitimacy. Generally, but not conclusively, most of the studies found positive relationships between the driving forces and benefits (Marimon et al., 2019).

Braunscheidel et al. (2011) conducted a study to examine motivation and impact of Six Sigma on organizational performance from the institutional theory perspective. From the seven case studies, they uncovered that normative isomorphic pressure was not the main motivation factor in adopting Six Sigma and was not apparent at the early stage of implementation compared to coercive or mimetic pressures. The presence of normative isomorphic pressure

was evident in the implementation of Six Sigma as the companies decided to adopt Six Sigma, and therefore, equip their employees with the Six Sigma knowledge via consultants (Juran Institute, iSixSigma) or professional agencies (American Society for Quality). Coercive pressure could be enforced formally via contract specifications or informally by rhetorically discussing the Six Sigma implementation advantages.

As for ISO 9001, ISO 9001 certification is an effective organization communication means to demonstrate and legitimate their quality management practices to the interested stakeholders (Clougherty & Grajek, 2008). Nowadays, ISO 9001 becomes one of the significant factors for selecting suppliers and business partners (Douglas et al., 1999) hence likely to bring some commercial values. This indicated that ISO 9001 is increasingly being accepted, recognized and institutionalized worldwide. Therefore, it is inevitable and companies need to follow the trend, getting certified and meeting the standard requirements to ensure their legitimacy and credibility (Boiral, 2003).

2.6.3 Institutional Work

Institutional work shifts institutional study's interest to the active role of actors in institutionalization process instead of viewing them as passive (Phillips & Lawrence, 2012). Institutional work emphasizes practices and the interaction between institutions and the social actors with the assumption that the actors manage to influence institutions either in creating, maintaining or disrupting the institutions (Lawrence et al., 2011). An increasing popular subset of institutional work is institutional entrepreneurship, which refers to the 'activities of actors who have an interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones (Maguire et al., 2004). Actors able to influence changes in institutional environment if the actors change the institutional pillars. The three institutional pillars are the regulative (rules and laws), the normative (norms) and the cultural-cognitive (beliefs and meanings) (Scott, 2008). However, to change the normative and cultural-cognitive pillars is quite challenging tasks and requires substantial efforts (Närvänen et al., 2021).

There are limited studies conducted in understanding the role of actors for QIs implementation in manufacturing companies. One of the studies identified was LM implementation in Toyota. Toyota, as the pioneer of LM QI, allowed visitors, such as practitioners and academician to visit and observe their LM system. However, Perkmann and Spicer (2008) mentioned that instead of Toyota, other actors such as consultants and academician were the ones who played the main role in disseminating the LM practices. This indicated that the LM institutionalization efforts were not organized in a centralized way but distributed across the field.

Another example is the Six Sigma implementation. Motorola, General Electric and Allied Signal were among the successful early adopters of Six Sigma with tremendous improvement and cost saving. Therefore, other organizations eagerly joined the Six Sigma bandwagon after listening to the successful stories. Rapid dissemination of Six Sigma in the U.S. might be due to the promotion effort of professional agencies, for instance the American Society for Quality (ASQ), formal education provided by universities, such as Motorola university and expanding professional networks (Braunscheidel et al., 2011).

2.6.4 Institutional Logics

The term institutional logics was first introduced by Alford and Friedland (Gulden et al., 2020) has become increasingly popular in the organization studies starting with a few articles in the early 1990s to a huge wave of articles in the 2010s (Reay & Jones, 2016). Institutional logics undertake a structural and macro approach with a multidimensional, cross-level analysis (Lounsbury & Boxenbaum, 2013) that provides a "non-functionalist conception of society, as a potentially contradictory interinstitutional system" (Friedland & Alford, 1991, p. 240), whereby contradicting and interdependent pressures were imposed by various institutional logics also known as institutional complexity to create rooms for leaders own vague translation and interpretation (Greenwood et al., 2011). Additionally, from the review, (Logue et al., 2016) highlighted that institutional logics was associated with internal dynamics of logics, which was in line with (Thornton et al., 2012, p. 44), that individuals had a variety

of options and their views of rationality were closely linked to the sensemaking within the institutional order context. Douglas investigated the 20-year field-level discourse of Fortune 500 firms and found that deinstitutionalization of conglomerate firms was due to the overemphasizing of the organization as body analogy (Douglas, 1986, as cited in Logue et al., 2016). Davis et al. (1994) further explained that the institutional logics shifted from the organization as body to the organization as network.

Vidal (2017) conducted a study of institutional logics of Lean, whereby he highlighted three institutional logics. Firstly, an organization could decide to allow substantial employees' empowerment to enable lean-as-system, since empowered workers enabled continuous improvement to run with minimal supervision. Secondly, an organization could select consultative participation management instead, whereby the improvement should be monitored and managed by management rather than empowered workers. Thirdly, an individual autonomy conflicted with standardization requirements of lean-as-system.

2.7 Theories Synthesis and Discussion

Table 2.6 summarizes the identified institutional theories, its criteria and condition, and the findings, or its expected outcomes. Convergence/ Divergence practices was an interesting area, especially for practitioners since it was closely related to the real QIs implementation. For example, in teamwork practices, it was found that the teamwork practices might be influenced by the fashion cycle practices and liven up the ability of management sense, making and interpreting viability. Various authors highlighted the importance of top management, as one of the key success factors of the implementation. The top management power dynamics was capable to halt or push forward the practices, and thus, contributed significantly to the decoupling or tight coupling practices. However, since decoupling practices is challenging and contradict the organization's values and beliefs, over time, organizations have to decide either to totally abandon the practices or internalize and change the core technical, therefore shifting to the tight coupling practices ideal.

There were a few indicators that could be utilized in assessing the degree of institutionalization, such as legitimacy, rhetorical model and five indicators, and five bases of evaluation, as proposed by Zeitz et al. (1999). The indicators and five bases to evaluate the degree of institutionalization was quite comprehensive since it examined broad areas and covered multiple angles of institutional pressures, including culture and belief. However, despite the comprehensive evaluation proposed by Zeitz et al. (1999), there were only a few attempts in evaluating the degree of institutionalization in certain organizations' settings and practices (Gonzalez, 2011). Gonzalez (2011) emphasized that organizations should take extra care of political, functional and social pressures to ensure the practices sustainability and avoid de-institutionalization practices.

As for QIs dissemination, four research themes were discussed. First was organizational environment which the central of investigation focused on interaction with institutional pressures and cultural aspects. From the publication trend (Figure 2.2), these research theme areas had been covered widely by institutionalist researchers. Every organization field was constituted with various institutional pressures: mimetic, coercive and normative. Similar institutional pressures are expected to stimulate the isomorphic practices.

Second was QIs implementation motivation. Various researchers highlighted that time of adoption, meaning system and legitimacy, influenced the QIs implementation. Early researchers stated that the adopters' motivation shifted from technical to legitimacy aspects, based on time of adoption. However, Love and Cebon (2008) emphasized that the technical motivation was still present, but the amount of concern might decline over time with increasing institutional pressures.

As for the institutional work and institutional logics, even though there were quite a number of studies related to both areas, there was still a lack of study conducted in the manufacturing industries, in terms of QIs implementation. Manufacturing industry is a complex industry environment. Therefore, the views on institutional work and logics were quite promising and should be indulge deeper.

Table 2.7 summarizes the existing studies conducted by various authors related to QIs from institutional theory perspectives. There were numerous studies related to TQM and ISO 9001 QIs compared to lean and Six Sigma. This indirectly indicated that TQM and ISO 9001 are receiving wide acceptance, thus gaining increasing interest from researchers at one point of time. In terms of legitimacy, it was found that ISO 9001 imposed clear communication means to legitimate the practices with ISO 9001 certification. Even though there is increasing doubt that ISO 9001 is able to improve the organization's competitive edge, manufacturing companies still have to go for the certification in order to secure the market legitimacy.

The TQM, even without certification, projected legitimacy value, as the success stories evidence was very strong that resulted from Japanese companies, which were able to wrack havoc in the American business market. TQM was institutionalized based on rhetorical theory perspectives conducted by Green et al. (2009). However, the practices implemented were not as per TQM principles, decoupled from technical core and became language and rhetorical games for TQM fashion cycle, which changed from boom to bust. TQM framing logics gradually lost its identities resulted from the emergence of various QIs and best practices. This trend seems to indicate that TQM become a fad, but is that really the case, or otherwise, TQM practices become institutionalized and taken-for-granted as the way things are. This view was supported by the TQM teamwork study conducted by Cooney and Sohal (2004), whereby they concluded that TQM teamwork was sustained, but not fix or static due to the interpretive viability of managers. Since TQM have been around for more than 50 years, it is expected that during the diffusion process, some of the TQM principles are lost during the re-embedded (edit and translate) process by managers' idiosyncratic activities and interpretation.

Table 2. 6. *Summary of Identified Institutional Theories*

Institutional theory		Criteria and condition	Outcome/Findings
Convergence/ Divergence practices	Teamwork	Management interpretative viability (Cooney & Sohal, 2004)	Institutional stretch. Practices is not statis.
	Decoupling	Ceremonial practices (malign or benign decoupling) (Sandholtz, 2012)	Minimum or medium changes to the technical core
		Power dynamics (e.g., top management) (Boxenbaum & Jonsson, 2008, p. 87)	Mediate the desire and action of decoupling
		Decoupling formal structure and actions (Barley & Tolbert, 1997)	Rare and short lived
	Tight coupling	Internalization precedes standardization (Sandholtz, 2012)	Successful implementation
	Convergence factors and divergence factors	Mostly occurred to macro-level aspects (Child, 1981)	Convergence practices
		Strong external pressure, wide acceptance, direct competitive pressures (Beckert, 2010)	Convergence practices
		Mostly occurred to micro-level aspects (Child, 1981)	Divergence practices
		Influential guardian of the original institutional rules, equivocal opinion, the desire in institutional distinction, lack of practices legitimacy, and differentiated products (Beckert, 2010)	Divergence practices
		Multiple institutional logics in organizational field (Greenwood et al., 2011; Vidal, 2017).	Convergence or divergence practices
Institutionalization	Rhetoric	Rhetorical model of institutionalization using the structure of arguments (Green et al., 2009).	Institutionalized when the arguments collapse from syllogisms into enthymemes and finally into claims
	Carriers	Three primary carriers: formal organizations, regimes and culture (Jepperson, 1991, p. 150).	Institutionalization
	Indicators	5 indicators: compatibility, formalization, depth, systemic coherence, and amount of interdependency and 5 bases of evaluation (models, culture, education, regulative, and technical-rational (benefits) (Zeitz et al., 1999)	Five indicators to assess the degree of institutionalization
	Diffusion	Fashion cycle (David &Strang (2006) Consultant dynamics during preboom, boom, bust – Generalist or technical expert consultant	Fashionable practices can return to their technical roots (sustained) after the hype is over, reversing the usual institutional trajectory
	Sense-making	Disembedded, translate and re-embedded (Czarniawska & Joerges, 1996)	Important features will be idiosyncratic and based on organization-level interpretation and problem-solving processes.
	De-institutionalization	Political, functional, and social pressures (Gonzalez, 2011)	Failure of institutionalization lead to institutional remnants and custodians/entrepreneurs.

Table 2.6. *Summary of Identified Institutional Theories (Continued)*

Institutional theory research theme		Criteria and condition	Findings/ Outcome
Organizational environment	Institutional pressures mechanism	Uncertain environment (DiMaggio & Powell, 1983)	Lead to mimetic pressure
		Similar institutional pressures (Mimesis (mimetic), power (coercive), and attraction (normative) (DiMaggio & Powell, 1983)	Stimulate isomorphic (organization mimic and adopt similar structures and processes)
		The topographical institutional pressure	Pressure from above is coercive pressure. Horizontal pressures are mimetic and normative pressure.
	Organizational culture	Organizational culture (procedurally focused, employee oriented, structurally open, socially loose, rule driven (norm) and market oriented) (Cadden et al., 2020)	Positively associated with QIs (lean practices) integration
		Local historical and cultural tradition (Moore & Rees, 2008)	Successful of implementation
Motivation	Time of adoption	Early adopter driven by technical, late adopter driven by legitimacy (DelliFraine & Langabeer, 2009)	The later the adoption, the stronger the institutional pressure
	Meaning system	Imitation, theorization, and institutionalization processes (Love & Cebon, 2008)	Driven by technical rationality throughout, perception shifts from the organizational-level meaning system towards the field-level meaning system
	Legitimacy	ISO 9001 certification (Lo & Yeung, 2018)	Secure market legitimacy
		Persistence, prevalence, change in material practices, structure of argument (rhetoric) (Green et al., 2009)	Legitimacy indicator
	Adoption factors	Current trends, impulse, persuasion, power (regulation) or culture (Sturdy, 2004)	Adoption due to less rational reasons
Institutional work	Agency of actors	Active role of actors in institutionalizing process (Phillips & Lawrence, 2012).	Actors manage to influence institutions either in creating, maintaining or disrupting the institutions.
		Instead of Toyota, various agency of actors promoting lean management systems such as consultants and academicians (Perkmann & Spicer, 2008)	Institutionalization efforts are not organized in a centralized way but are distributed across the field.
Institutional logics	Empowerment logics	Substantial employee empowerment, consultative participation management, and an individual autonomy (Vidal, 2017)	Facilitate QI-as-system.
	Contradict logics	Potentially contradictory interinstitutional system (Friedland & Alford, 1991, p. 240)	Create rooms for leaders own vague translation and interpretation (Greenwood et al., 2011).
	Dynamics of logics	Logue et al. (2016) internal dynamics of logics	Individuals have a variety of options and view rationality based on their sensemaking (Thornton et al., 2012, p.44)

Table 2. 7. *Summary of QIs from Institutional Theory Perspectives*

Institutional theory	TQM	ISO 9001	Six Sigma
Legitimacy	Social and commercial value	Certification recognized worldwide Influence market legitimacy but not investment legitimacy (Lo & Yeung, 2018)	Commercial value
Institutionalization	Institutionalized as the arguments collapse from syllogisms into enthymemes and into claims	Increasing doubt about ISO 9001 competitive edge as the diffusion widespread (Naveh & Marcus, 2005)	
Motivation	Building legitimacy	Building legitimacy	Due to coercive (customers) and mimetic pressures. Normative pressures present during implementation (Braunscheidel et al., 2011)
	Institutional trajectory during fashion cycle: rational (preboom) to ceremonial (boom) to rational (bust) (David & Strang, 2006)	Early adopter driven by effectiveness (rational), late adopter driven by institutional pressures (ceremonial) (DelliFraine & Langabeer, 2009)	
Organization Environment	Strong social and commercial pressures (Cole, 1999; Zbaracki, 1998)	Significant factor in suppliers and business partners selection, commercial value.	Companies joined the Six Sigma bandwagon due to the successful stories of pioneered adopters (Staw & Epstein, 2000)
		Institutional coercive isomorphism as dominant pressure due to government rules and regulations and customers' demand (food industry) (Dora et al., 2013)	Normative pressures are from ASQ universities and professional networks, CEO attended benchmarking meeting, attend Motorola consortium, internal expert (master black belt), sister company ((Braunscheidel et al., 2011)
Convergence/ Divergence practices	Not fully implemented as per TQM principles	Rampant decoupling (Zbaracki, 1998)	
	Become language and rhetorical games (Cole, 1999; Zbaracki, 1998).	Decoupled and tight coupling depends on existing occupational (engineers) receiving end confrontation (Sandholtz, 2012)	
	Build ideal image but decouple from technical core (Reger et al., 1994; Dutton & Dukerich, 1991)	Top management of certified ISO 9001 companies are viewed as the legitimate leaders and positively appraised by the stakeholders (Lo & Yeung, 2018; Sandholtz, 2012)	
	Actions influence by senior managers instead adherence to TQM principles		
	TQM and BPR definitional framing moving toward convergence. Both logics gradually losing their original identities (Jung, 2008)		
	TQM teamwork practice is sustained but not statis due to institutional stretch (Cooney & Sohal, 2004)		

Another popular quality initiative is Six Sigma which was originated by an American manufacturing company, Motorola. Parts of Six Sigma practices are modified from TQM principles to suit American values and beliefs. Furthermore, Six Sigma is an emerging quality initiative amidst the pursuit to fill the TQM practices gaps. Similar to TQM, Six Sigma represents a commercial value and market legitimacy. Coercive pressures from customers and mimetic pressures imposed from the success stories were evident at the early stage of the adoption decision, followed by normative pressures during the implementation stage. Since Six Sigma was established in U.S., various agencies, education entities and professional networking have taken part in disseminating the practices worldwide.

From the above discussion, there are a few potential areas that should be explored and examined further such as institutionalization, institutional work, institutional logics and QIs practices. Due to the complexity of manufacturing industries, simple explanation of the processes and factors influencing the outcomes is not quite sufficient. There is still lack of explanation related to decoupling or tight coupling factors and convergence or divergence practices. Moreover, specific organization field even in the same manufacturing industries may receive different type of institutional pressures. For example, in the food industry, the government plays an active role in enforcing the rules and regulations due to the nature of the business which is related to consumers' health and safety. This suggests that the nature of business and products served to the end users do affect the kind of pressures applied. Besides, there are still very few research both on Six Sigma (especially in practices aspects) and LM from the institutional theory perspectives should be explored and expanded more. The discussion related to institutional logics is still lacking. Agencies and actors' contribution in the institutionalization of the QIs are also hard to identify and summarize which indicates that there is still room for the institutional work such as entrepreneurship study in examining the role of actors and agencies in QIs institutionalization.

2.8 Conclusion

It can be concluded that all the QIs constitute various institutional pressures throughout the implementation process with coercive pressure by customers in meeting market legitimacy and mimetic pressures from successful stories influencing the decision to adopt the QIs. Some parts of definitional framing seem to be overlapping with each other showing that the QIs are reciprocally influencing one another. There is also a clear legitimacy indicator such as certification contributing to the sustainability and institutionalization of ISO 9001. However, decoupling and divergence practices are evident in most of the cases. This situation may raise various research questions in order to explore the reasons behind why this situation occurred, for example: 1. Why the practices are still decoupled from the technical core even when the main objective of the QIs implementation is to improve companies' performance? 2. What and how certain mechanisms will lead to convergence or divergence of the practices? 3. Will the practices be institutionalized or de-institutionalized or remain decoupled?

It can be observed that the institutional theorists research interest has shifted from understanding the isomorphism to explaining the factors that contribute to the convergence and divergence of the practices. Over time, various institutional theories were improvised and proposed by various authors which sometimes contradict one another. The emergence of the institutional logics and institutional work indicates that various factors are affecting the dynamics of institutionalization process and emphasizing the institutional complexity. From the critical review, it was found that there is still a lack of study in explaining various logics affecting the convergence or divergence of practices and its institutionalization outcome. Even the agencies and actors' capable of enacting actions that can shape the institution study are also still scarce. Therefore, there is a need to conduct in-depth studies on the interaction influencing the QIs at both micro and macro implementations via various levels of analysis.

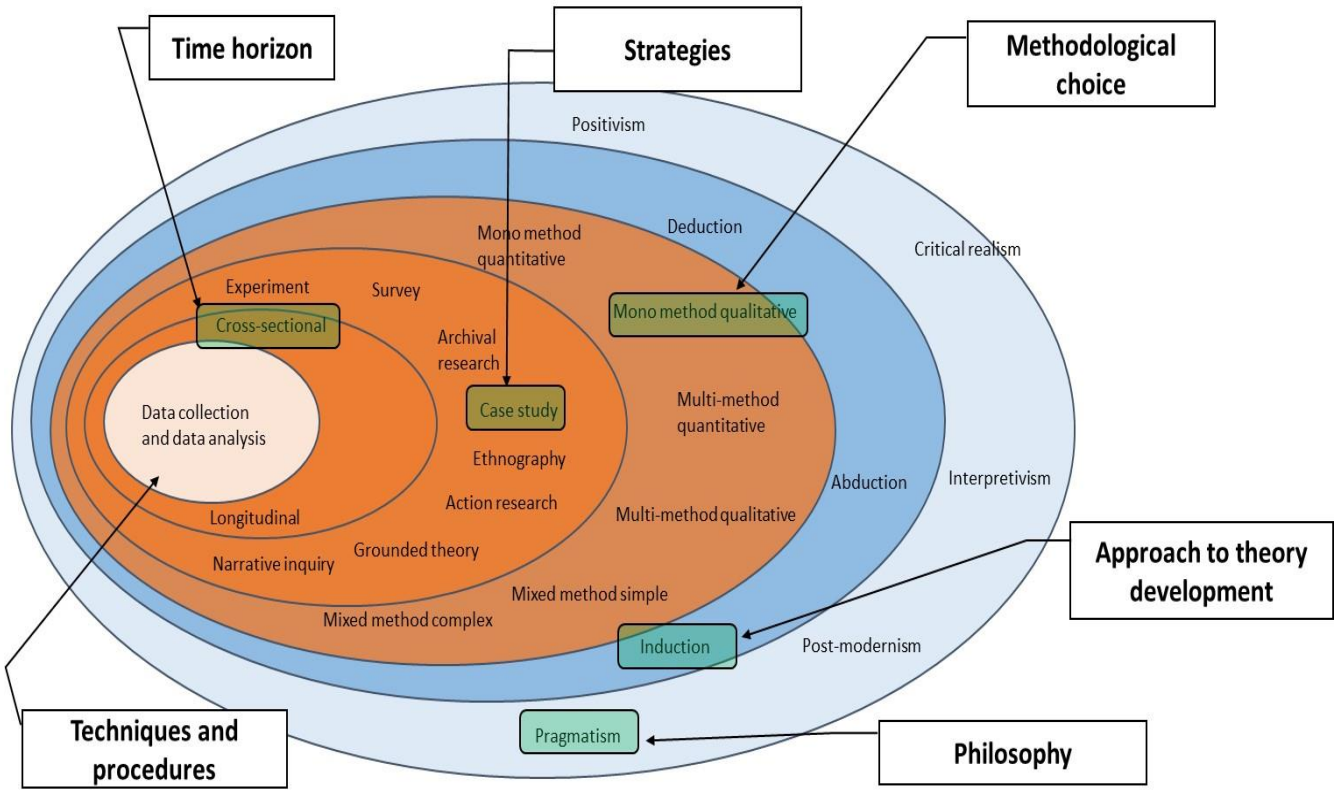
Most of the QIs research tend to view QIs from the technical logic and efficiency perspectives with substantial number of articles discussing QIs implementation and its effects on organization performance and sustainability. Thus, in light of this almost one-sided view, this literature review can contribute to a better understanding of QIs from a different point of view which is the symbolic institutional theory perspective.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

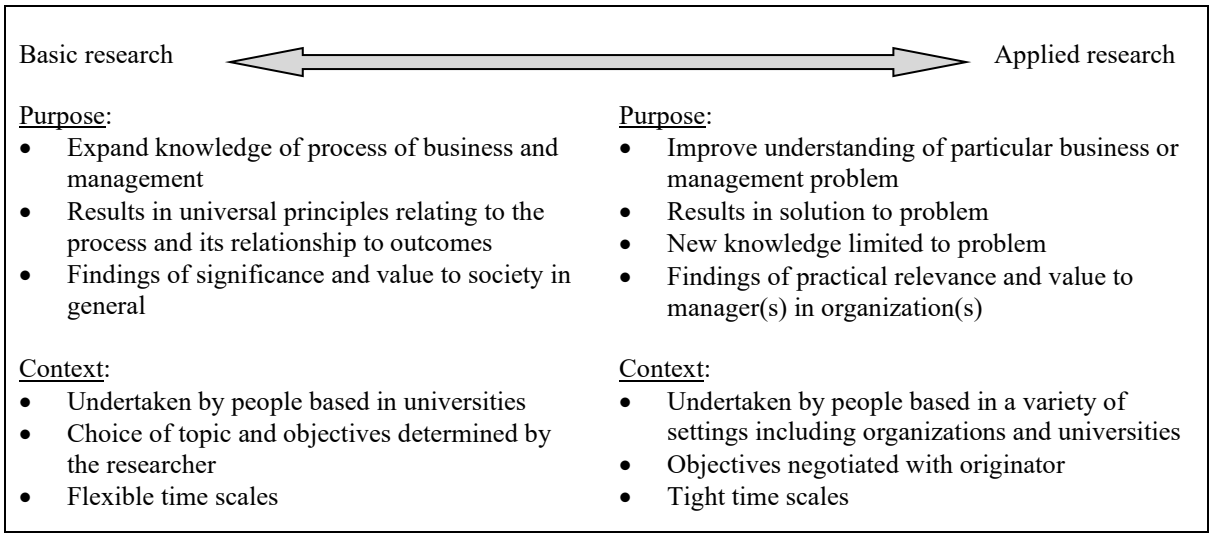
This chapter provides an overview of the process in deciding the proper research methodology based on philosophy and assumptions, approach, strategies, time horizon, techniques, and procedures. Based on the research onion proposed by Saunders et al. (2016, p. 124), a detailed discussion and explanation will be provided to justify the reasons behind the decision in adopting the research methodology (Figure 3.1). Saunders et al. (2016, p. 9) mentioned that there are basically two research continuums: basic research and applied research (Figure 3.2). In this study, since the research purpose is to improve understanding and bring insights to the QI implementation status from the institutional theory perspective with tight time scales, it can be expected that the outcome of the research will contribute heavily to the end of the applied research continuum.

Figure 3. 1. *Research Onion*



Note. Adapted from Saunders et al. (2016, p.124)

Figure 3. 2. *Basic and applied research*



Note. From Saunders et al. (2016, p.9)

Referring to the philosophies listed in the research onion, the researcher philosophy is closely related to the three philosophies in general as summarized and bolded in Table 3.1. This research is focusing on capturing the complex and the richness of QI implementation, which are closely related to social constructed studies with multiple meanings, interpretations, and realities while studying various QI practices. However, the researcher believes that the knowledge constitution is from various sources such as practical meaning in specific contexts, which focuses on practices and problem solving as well as numbers, causal explanation, and new understanding as knowledge contribution. Overall, it can be concluded that the research philosophy is leaning toward pragmatism philosophy. Therefore, based on the research problems and questions, the inductive research approach with mono-method qualitative methodological choice is considered further. The inductive approach is appropriate for an in-depth investigation of the complex and rich QI implementation. Mono-method qualitative methodological choice was chosen but multiple sources of evidence were used to improve data triangulation, hence increasing the research quality and reliability.

Table 3. 1. *Summary of the Positivism, Interpretivism, and Pragmatism Philosophy*

Assumption type	Positivism	Interpretivism	Pragmatism
Ontology (Nature of reality or being)	Real, external, independent One true reality (universalism) Granular (things) Ordered	**Complex, rich** **Socially constructed through culture and language** **Multiple meanings, interpretations, realities** **Flux of processes, experiences, practices**	**Complex, rich,** external 'Reality' is the practical consequences of ideas **Flux of processes, experiences and practices**
Epistemology (what constitutes acceptable knowledge)	Scientific method Observable and measurable facts Law-like generalisations **Numbers** **Causal explanation and prediction as contribution**	Theories and concepts too simplistic Focus on narratives, stories, perceptions and interpretations **New understandings and worldviews as contribution**	**Practical meaning of knowledge in specific contexts** **'True' theories and knowledge are those that enable successful action** **Focus on problems, practices and relevance** **Problem solving and informed future practice as contribution**
Axiology (role of values)	Value-free research Researcher is detached, neutral and independent of what is researched Researcher maintains objective stance	Value-bound research **Researchers are part of what is researched, subjective** Researcher interpretations key to contribution **Researcher reflexive**	Value-driven research **Research initiated and sustained by researcher's doubts and beliefs** **Researcher reflexive**
Typical method	Typically deductive, highly structured, large samples, **measurement,** typically quantitative methods of analysis, but a range of data can be analysed	Typically inductive. Small samples, **in depth investigations,** qualitative methods of analysis, but a range of data can be interpreted.	**Following research problem and research question** **Range of methods: mixed, multiple, qualitative, quantitative, action research** **Emphasis on practical solutions and outcomes**

Note. Adapted from Saunders et al. (2016, p.136)

Yin (2018, p. 9) recommended five research strategies that consist of experiment, survey, archival analysis, history, and case study (Table 3.2). The research questions are asking what, how, and why, require no control of behavioral of the study subjects, and focus on the contemporary events. Besides, there is still no research of comparison of quality initiative implementation, its initiatives history, dissemination, and driving factors between Japanese and Malaysian companies from the institutional theory perspective, thus it was found necessary to study and further enrich and contribute to this area. Therefore, out of the five strategies, the case study strategy with cross-sectional time horizon was chosen to examine how quality initiatives are practiced by current manufacturing companies. Case study is believed to be the

most appropriate strategy (Salonen, 2011) since currently, conflicting findings from various researchers exist, which requires better understanding and thorough investigation to disclose why the existing phenomena occur. Yin (2018, p. 15) described that a case study is an in-depth empirical study to uncover the real phenomenon in an actual situation, especially where the boundary between the phenomenon and context is hard to differentiate. Throughout the case study, researchers are able to acquire accurate responses and justification from respondents via in-depth interviews, which is essential to discover current industry practices prior to aligning with the terminology or theory (Runeson & Höst, 2009).

Table 3. 2. *Relevant Situations for Different Research Methods*

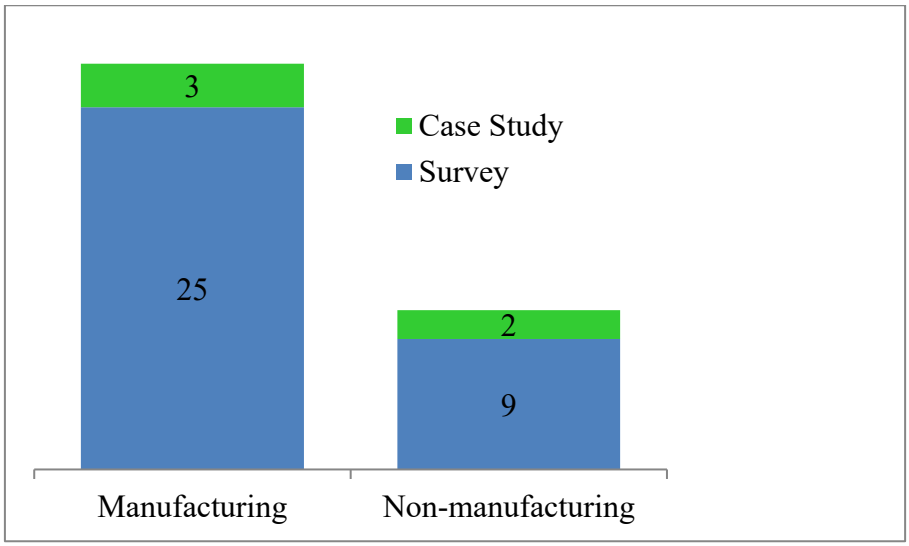
Method	For of Research Question	Require Control Over Behavioral Events?	Focuses on Contemporary Events
Experiment	How, Why?	Yes	Yes
Survey	Who, What, Where, How many, How much?	No	Yes
Archival Analysis	Who, What, Where, How many, How much?	No	Yes / No
History	How, Why?	No	No
Case Study	How, Why?	No	Yes

Note. From Yin (2018, p.9).

Figure 3.3 shows the QI related research, which have been conducted in Malaysia from 1996 until 2021. Based on the figure, 28 articles (72%) focused on manufacturing industries while 11 articles (28%) focused on non-manufacturing industries. Out of 39 articles, 34 articles that represented 87% of the total articles utilized the survey strategy while the remaining articles (13%) utilized the case study strategy. Table 3.3 lists five case studies conducted in relation to QIs. Three articles (Mustapha et al., 2019; Ng et al., 2021; Zailani, 1998) are associated with the manufacturing industry while the other two articles (Sohail et al., 2003; Wahid, 2019) are associated with the education industry. For example, Ng et al. (2021) conducted a study to examine the four QI initiative implementations (5S, Kaizen, Lean Manufacturing, and Six Sigma) at limited numbers of manufacturing companies in Malaysia. Based on the identified studies conducted in Malaysia, it is revealed that the case study strategy is very limited in numbers. Therefore, complex and rich information from the case study

findings is scarce and there is a need to cover further insights into the reality of manufacturing industries in Malaysia via a comprehensive case study strategy.

Figure 3. 3. *QIs related research conducted in Malaysia (1996 until 2021)*



Note. Summarized by author from literature

Table 3. 3. *The five case study research conducted in Malaysia*

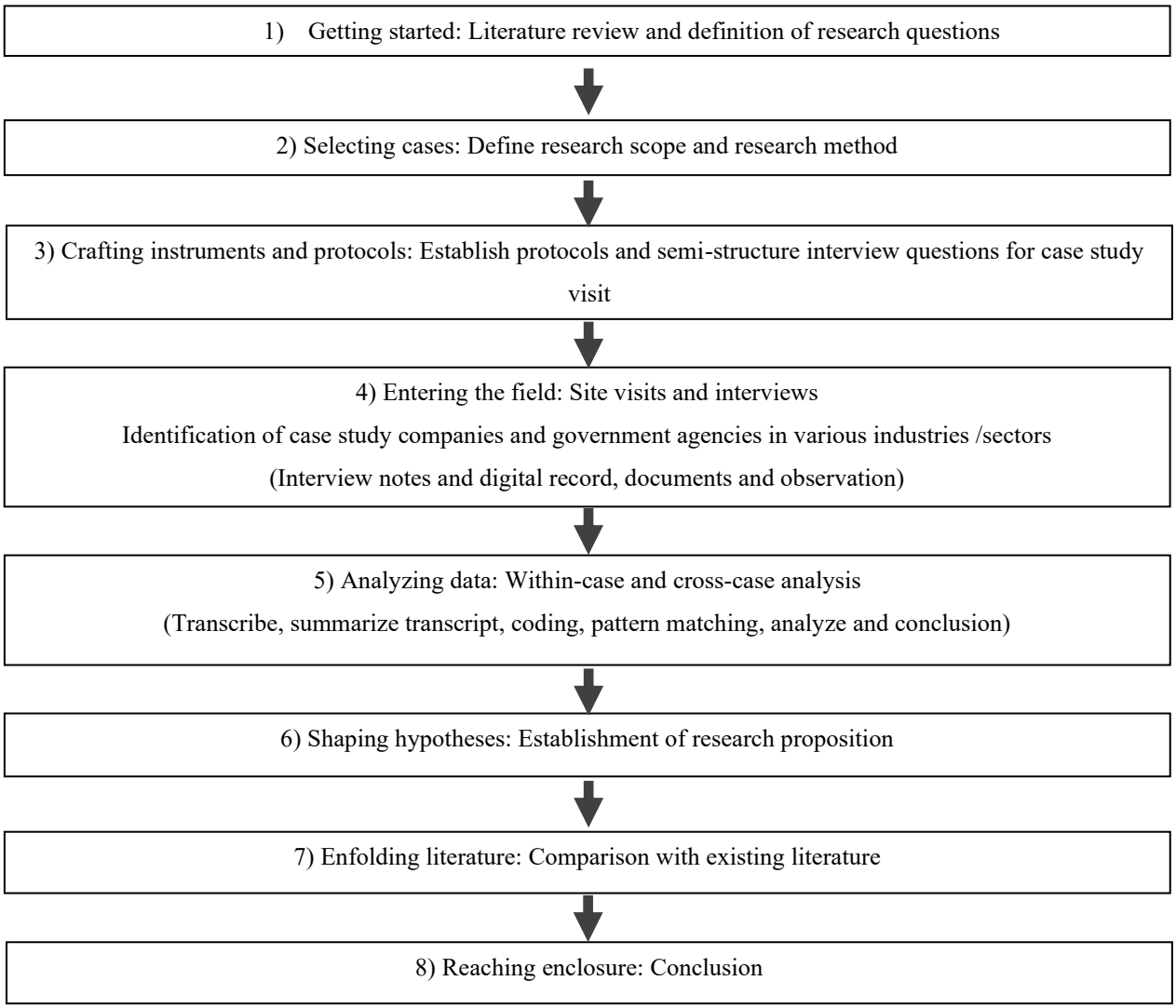
Author (s)	ISO 9001	TQM	5S	Kaizen	LM	Six Sigma
Ng et al. (2021)			√	√	√	
Wahid (2019)	√					
Mustapha et al. (2019)					√	√
Sohail et al. (2003)	√					
Zailani (1998)				√		

Note. Summarized by the author from the literature review.

3.2 Research Methodology

The researcher's philosophy is leaning toward pragmatism, which is generally flexible in applying a range of methods in order to answer the research questions. Thus, the research methodology adopted the eight steps of Eisenhardt's research methodology (1989) based on the facts that Eisenhardt's case study strategy emphasized more on the inductive approach compared to Yin (Yokozawa et al., 2011) with the aim to analyze emerging patterns for building or expanding theories. The research methodology is displayed in Figure 3.4.

Figure 3. 4. *Research Methodology*



Note. Adapted from Eisenhardt (1989)

First, literature review was conducted to identify the research gaps in order to specify the research objectives and questions. Second, research scopes and method were defined in order to determine the research population and narrow down the selection of cases. Third, relevant protocols and semi-structured interview questions were established based on current practices on recognized research scholars. Fourth, before entering the research field, the number of case study organizations (companies and government agencies) from various sectors was determined and finalized subjected to the management of the organizations' permission approval. The organizations with approved permission were visited for the in-depth interview sessions, whereby the interview data were noted and recorded, the documents were kept, and the work environment was observed to enrich further research findings, results, and analysis purposes. Fifth, the interview outcomes or qualitative data were transcribed, summarized, and

coded, and the patterns were matched, analyzed, and concluded. All the transcripts were coded using ATLAS.ti version 8.4.25 software and if requested, the full copy of coding data is available for submission. Sixth and seventh, the research propositions were established and a comparison with the existing literature was made. Finally, a disclosure was reached that concluded the research findings from managerial and practical implications together with some recommendations for future research.

3.3 Step 1- Getting Started : Literature Review and Definition of Research Questions

Critical review was utilized to examine the current literature and to identify the existing research gaps related to QIs from institutional theory perspective. This critical review sought to discover and identify the existing institutional theories significance and gaps, and thus, recommend for future potential research area. This critical review adapted Mclean et al. (2015) robust expanded three stages review procedure modified from Tranfield et al. (2003), Bakker (2010) and Rashman et al. (2009). The stages were: (1) Planning the review, (2) Conducting the review and (3) Reporting and dissemination (results), as shown in Figure 3.5.

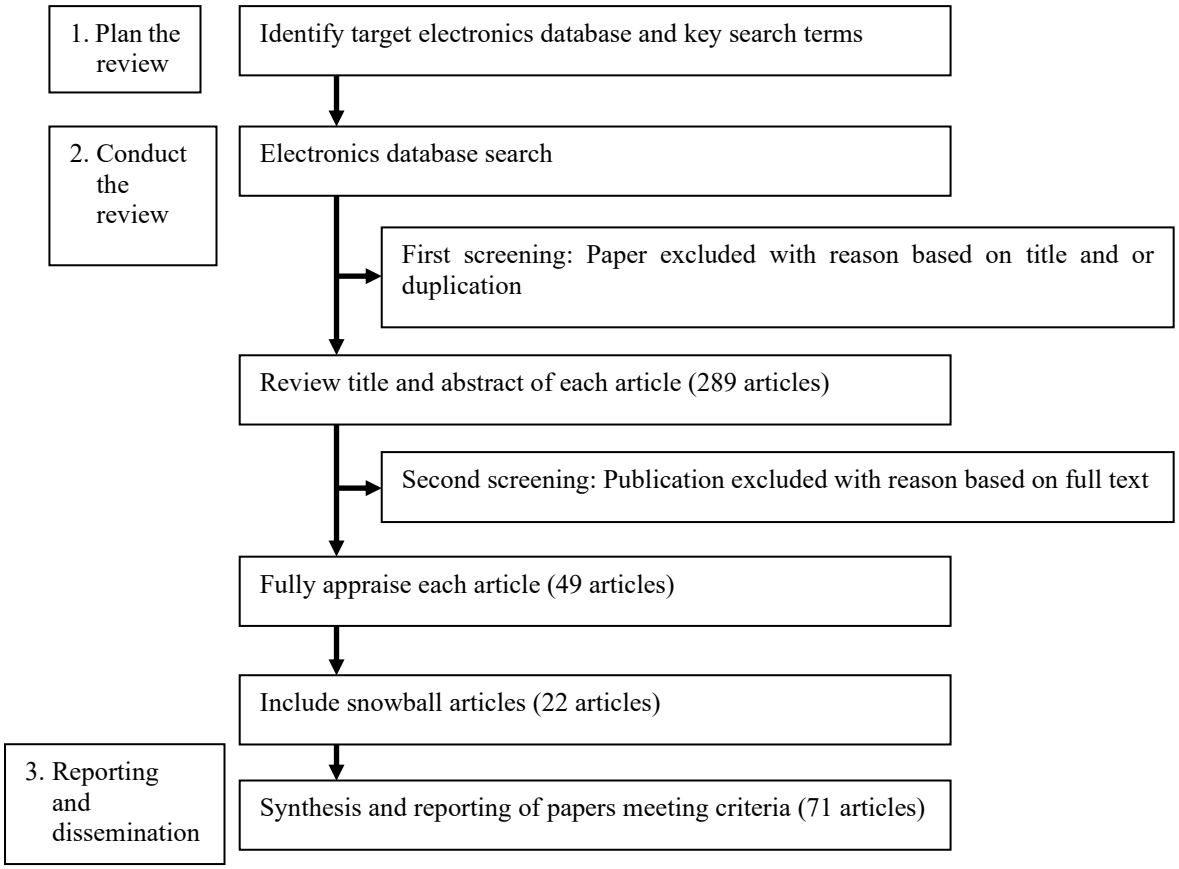
3.1 Planning the Review

The first stage of this critical review research was planning the review, whereby the main activities were to clarify the review objectives, scopes and criteria of inclusion and exclusion of published articles. The publication period, types of information and articles desired, relevant databases and search strings were determined. This critical review attempted to summarize an overview of QIs implementation from institutional theory perspective with manufacturing industry as the research scope area. Moreover, the literature review search will focus on electronic database, which covers social sciences, sociology, operation research and management, business and management category. Therefore, Web of Science, Springer Link, EBSCOhost, JSTOR and Google Scholar were utilized to collect the relevant articles.

The articles keywords search covered QIs and its synonyms, institutional theory and manufacturing and its synonyms. The following keywords search were used to identify the relevant articles: [(“quality initiative” OR “continuous improvement” OR “total quality management” OR “Kaizen” OR “Six Sigma” OR “lean”) AND “institutional theory” AND (“manufacturing” OR “manufacture” OR “production” OR “shop floor”)]. The search period was set from 1975 onwards, taking into account the institutional theory development history, which was pioneered by Meyer and Rowan (1977) and strengthened by DiMaggio and Powell

(1983). For this review, only articles from academic journals as listed in the Academic Journal Guide 2021 had been taken into consideration, since the research was anticipated to be rigorously conducted and the findings were reviewed by professional experts from third party reviewer. Therefore, information from books, doctoral dissertations, news and conference papers were not included in this study. Table 3.4 summarizes the inclusion and exclusion criteria in selecting relevant articles to be fully appraised and reviewed.

Figure 3. 5. *Flow Diagram of Review Process*



Note. Adapted from *McLean et al. (2015).*

Table 3. 4. *Inclusion and Exclusion Criteria for Articles Appraisal Selection*

Inclusion criteria	Exclusion criteria
Articles related to QIs based on institutional theory perspective	Non institutional theory research
Publication date between 1975-2021	Publication before 1975 and after 2021
Academic journals based on Academic Journal Guide 2021	Journals other than listed in Academic Journal Guide 2021 by Chartered Association of Business Schools., books, doctoral dissertations, news and conference papers
Searching database platform: Web of Science, Springer Link, EBSCOhost, JStor and Google Scholar	Other than stipulated searching database platform
Manufacturing industry	Other than manufacturing industry (e.g., service, public sector, education, construction)
English language	Other than English language

3.2 Conducting the Review

The second stage was conducting the review. Database search was conducted based on the determined search strings. Table 3.5 shows the search results by each of the electronics database. The articles search was conducted from February to October 2021. A large number of articles (2,193 articles) were identified during the initial search results. First and second screenings were conducted to ensure the selected articles were relevant to the review inclusion criteria as listed in Table 3.4. During the first screening process, irrelevant articles were removed based on the title and duplication, which resulted in 289 articles to be considered further. The second screening was conducted by reviewing the abstracts and full text. As a result, 49 relevant articles were identified. Basic information of the articles, such as titles, author's name(s), publication journal, year and brief description of the research were summarized in an excel spreadsheet. The 49 relevant articles were fully appraised and additionally 22 snowball articles were further identified based on the reviewed articles and included in the review.

Table 3. 5. *Search Results Based on Database Platform*

Database	Search results	Number of articles after first screening exclusion	Number of articles after second screening exclusion
Web of Science	176	126	15
Springer Link	66	3	3
EBSCOhost	22	12	12
JStor	19	4	3
Google Scholar	1910	144	16
Snowball			22
Total	2193	289	71

Note. Aggregated by the author.

3.3 Reporting and Dissemination

The third stage consisted of reporting and dissemination of the review findings, which included comparing existing literature, analysis, synthesis and reporting activities. All relevant articles were fully appraised and reviewed. Further analysis and synthesis were conducted accordingly. As a result, the discussed institutional theories and research trends were identified. Discrepancies and contradictions were discovered and highlighted in order to grasp the institutional theory research gaps and potential areas for future research. From the critical review conducted, a few research gaps were identified, hence research objectives and research questions were derived accordingly as stated in section 1.4.

3.4 Step 2 - Selecting Cases: Define Research Scope and Research Method

Based on the literature review conducted, a few research gaps were identified which related to QIs convergence and divergence practices, institutionalization and dissemination in manufacturing industry. Research scopes were then determined as mentioned in section 1.5 to ensure that the research conducted within the focused area and the defined boundaries. In addition to that, the appropriate research methodology were determined as well to guide and ensure that the research conducted is on track and manageable. Research methodology included a detailed plan on how to collect, organize, manage, and analyze relevant data throughout the research process as mentioned in chapter 3.

3.5 Step 3 - Crafting Instruments and Protocols: Establish Protocols and Semi-structured Interview Questions for Case Study Visit

The case study research protocol for the semi-structured interview consisted of two main sections. Section 1 focused mainly on demographic information, which required the interviewee(s) from each case study company to provide general information corresponding to personal and company details during the interview session. The details included the name of interviewees, designation, name of the company, name of the department, number of employees in the company, organization chart, years of company establishment, years of ISO 9001 certification, type of sector, product category, and any other general information with regard to the company. For Section 2, ten sub-sections focused on the evaluation of QI implementation in manufacturing companies in Malaysia. All the questions in the case study research protocol were in English because all the interviewees were capable of communicating in English.

3.5.1 Case Study Research Protocol Validity

In order to achieve high validity for the interview research protocol, the questions in the case study were validated by an expert professor (academician) and practitioners (managers of manufacturing companies in Malaysia). The purpose is to validate the content of the research protocol and ensure the research protocol is logically understood from the interviewees' perspective, as well as theoretically produced according to existing literature (Kaynak & Hartley, 2008). Throughout the validation process by the expert and practitioners, minor modifications were performed based on several recommendations on the developed case study research protocol toward meeting content validity, readability, and ambiguity.

Hence, a set of research protocol consisting of 11 questions in Section 1 and 30 questions in Section 2 was used for the case study of Malaysian and Japanese manufacturing companies in Malaysia. In order to accomplish the research objectives, all the questions in every sub-section in Section 2 were produced based on adaptation and modification from multiple research conducted in the QI field. The sub-sections, total number of questions, relation to research question(s) are listed in Table 3.6, whereas the full set of case study research protocol, the assigned codes and the related references are presented in Appendix II.

3.6 Step 4 - Entering the Field

In-depth semi-structured interviews were conducted for various types of manufacturing companies in Malaysia. Before conducting the interviews, initial company backgrounds containing company name, contact number, address, type of manufactured products, ISO 9001 certification, and total employees were studied through company websites prior to further consideration in shortlisting the companies for the case study.

Table 3. 6. *Sections, Total Number of Questions and Respective Literatures*

No.	Sub-section	No. of questions	Relation to research question(s)
1	Quality Initiative Experience	4	QE1 is for RQ1; QE2 to QE4 are for RQ3
2	Management of System and Process, Key Performance Indicators and CI	3	MS1 to MS3 are for RQ1 and RQ2
3	Difficulties or Barriers, Important factors and Benefits	3	DB1 to DB3 are for RQ1
4	Management Leadership and Commitment	1	ML1 is for RQ1
5	Education and Training	3	ET1 and ET3 are for RQ2; ET2 is for RQ3
6	Resource Management	1	RM1 is for RQ1
7	Customer Focus and Design Quality Management	3	CF1 and CF2 are for RQ1; CF3 is for RQ2
8	Supplier Management and Management Transfer from HQ to other Branches.	4	SM1 is for RQ3; SM2 to SM4 are for RQ1
9	Work Environment and Culture	5	WE1, WE2 and WE5 are for RQ2, WE3 is for RQ1, WE4 is for RQ3
10	Contingency Plan and Future Trend	3	CP1 and CP2 are for RQ1; CP3 is for RQ3

Due to cost and time-consuming factors, each shortlisted company was contacted from Japan during the company's working hours. Besides identifying the manufacturing companies, the researcher also focused on seeking various related government agencies that are considered to having links and contributing to the QI dissemination to conduct detailed discussions and interviews. The targeted agencies are associated with training centers, research centers, consultants, vocational colleges, and universities, whereby all the agencies are under government ministries (Ministry of International Trade and Industry (MITI), Ministry of Entrepreneur Development and Cooperatives (MEDAC), Ministry of Human Resource (MOHR) Ministry of Education Malaysia (MOE), and Ministry of Higher Education Malaysia (MOHE).

Therefore, during the tele-conversation, a brief self-introduction was given to the receptionist that answered the phone call. Then, permission was sought from the receptionist to transfer the phone call to the quality department manager. If the manager was available, a detailed briefing with regard to the purpose of the case study was performed prior to seek

further permission for the case study visit. Sometimes, the manager advised the researcher to further contact the Human Resource (HR) Department for an official application. A seeking permission cover letter explaining the purpose of the case study and the example of the set of interview questions was sent via email to the manager of the Quality Department or HR Department. The cover letter was prepared by the author prior to the tele-conversation, in which detailed discussion was conducted between the author and university supervisor in order to produce strong justification for the case study visit. Besides, the example of the set of interview questions was prepared in English and comprehensively structured based on the pilot study toward achieving the case study objectives.

Initially, 120 manufacturing companies were contacted via tele-conversation from Japan and 67 manufacturing companies verbally agreed to receive the seeking permission cover letter. However, after follow-up via phone calls and emails, most of the manufacturing companies were unable to provide official permission due to company confidentiality policy and time constraint factors. Finally, 14 manufacturing companies, which consisted of eight Malaysian companies and six Japanese companies agreed to participate in this case study. 14 manufacturing companies are considered as very high participation as Eisenhardt (1989) mentioned that it is acceptable if the number of cases is between four and ten companies.

During the actual case study visit, the interview was conducted in English and/or Malay, whereby the interviewer briefly introduced the personal background and the case study objectives. Furthermore, the interviewer guaranteed that all the case study findings would remain confidential and only be used for research purposes. Before starting the interview session, the interviewer sought permission from the interviewee(s) to record all the interview sessions using a digital recorder. The interview session was completed between 70 and 270 minutes subjected to the number of information provided by the interviewee(s). Then, the companies arranged the site visit within the factory production line for better understanding on the daily overall production operations and available facilities invested to support production processes. Once the case study visit was completed, the recorded interview sessions were transcribed and fully translated into proper documentation.

3.6.1 Demographic Data

The case studies were conducted in three waves (first wave = first half of 2018, second wave = second half of 2018, and third wave = second half of 2019) of company visits, whereby each wave consumed between approximately five to ten working days and each day covered one or two companies subjected to company availability. Some of the companies were revisited for further data enrichment and justification. Eight Malaysian manufacturing companies and six Japanese manufacturing companies in Malaysia participated in the case study. Based on the Malaysia Standard Industrial Classification (2008), companies are categorized as large-sized (full-time employees are 200 and more), medium-sized (full-time employees are between 75 and 199), and small-sized (full-time employees are between 5 and 74).

According to the classification, both Malaysian and Japanese manufacturing companies covered all the categories; Malaysian manufacturing companies (large-sized = 2, medium-sized = 4, small-sized = 2) and Japanese manufacturing companies (large-sized = 3, medium-sized = 2, small-sized = 1). All 14 companies are established organizations and accredited with ISO 9001. The manufacturing companies consisted of three main sectors, namely plastics, machinery and equipment (M&E), and chemical-based (Malaysian Standard Industrial Classification, 2008) and located in several regions (north, central, and south) in Malaysia. A total of 14 case studies were conducted to ensure that samples from each industry category were sufficient. Table 3.7 summarizes the sector, size, and location of the 14 case study companies, while Appendix III presents the demographic information of the case study companies corresponding to Malaysian and Japanese manufacturing companies in Malaysia. The J abbreviation refers to a Japanese company while the M abbreviation refers to a Malaysian company. L, M, and S indicate the size of the company: either large, medium, or small, respectively. Meanwhile, Table 3.8 displays the specific company overview associated with the region, the participated interviewee(s) designation, and the companies years of experience in being accredited with ISO 9001.

Based on the 14 manufacturing companies, nine companies are located in the central region, two companies are located in the northern region, and the remaining three companies are located in the southern region. Generally, the management of Quality Assurance (QA) Department, such as QA Manager, was directly involved in the interview and could answer the in-depth interview questions. The full co-operation of the managers strengthened the data reliability since the managers are widely knowledgeable of the company system, have been established more than 15 years and accredited with ISO 9001 for more than five years.

Table 3. 7. *Sector, size and location of the case study companies*

	Malaysian manufacturing companies			Japanese manufacturing companies		
	Plastic	M&E	Chemical	Plastic	M&E	Chemical
Small-sized (5 - 74 employees)		MS1	MS2		JS1	
Medium-sized (75 - 199 employees)	MM1	MM2, MM3, MM4			JM1, JM2	
Large-sized (≥200 employees)	ML1, ML2			JL1, JL2		JL3
Total companies	3	4	1	2	3	1
Location (region)	Central	Central, South	North	Central	Central	North

Table 3. 8. *Specific company overview*

Company	Region	No. of interviewee(s)	Designation	Interview and site visit duration (Hours)	Company establishment		Accredited with ISO 9001	
					15 to 30 years	> 30 years	< 15 years	> 15 years
JL1	Central	3	QA Manager, Assistant QA Manager, QA Engineer	7.50		√		√
JL2	Central	1	Assistant QA Manager	1.25		√		√
JL3	North	1	General Manager of Technical and Quality Division	2.00		√		√
JM1	Central	1	QA Manager	2.00		√		√
JM2	Central	2	Assistant General Manager (Production Engineering and QA/QC), QA Assistant Manager	2.80	√			√
JS1	Central	1	QM Assistant Manager	2.50		√		√
ML1	Central	1	QA Manager	1.75		√	√	
ML2	South	2	QA Assistant Manager, QA Engineer	2.50		√		√
MM 1	Central	2	Senior Manager (Engineering and QA/QC Department), Business Development Manager	3.50		√		√
MM 2	Central	1	Vice President Quality & HSE	3.25	√		√	
MM 3	South	1	QA Manager	2.00		√		√
MM 4	South	2	QA Manager, QC Executive	2.50	√		√	
MS1	Central	2	QA Manager and HR manager	4.50	√		√	
MS2	North	1	QA Manager	2.00	√		√	

As stated in the previous section, the discussion and interview were also conducted at several government agencies. During the three waves of case study period, seven agencies agreed to cooperate in this research. All the agencies are located in the central region and the participated interviewees are from professional and top management level. Discussion and interview with those agencies' respondents are aligned with the visit purposes, which are to understand recent practice of QIs implementation and awareness level from administration officers, academician, and consultants' perspectives. Table 3.9 summarizes the information related to the visited government agencies and education entities.

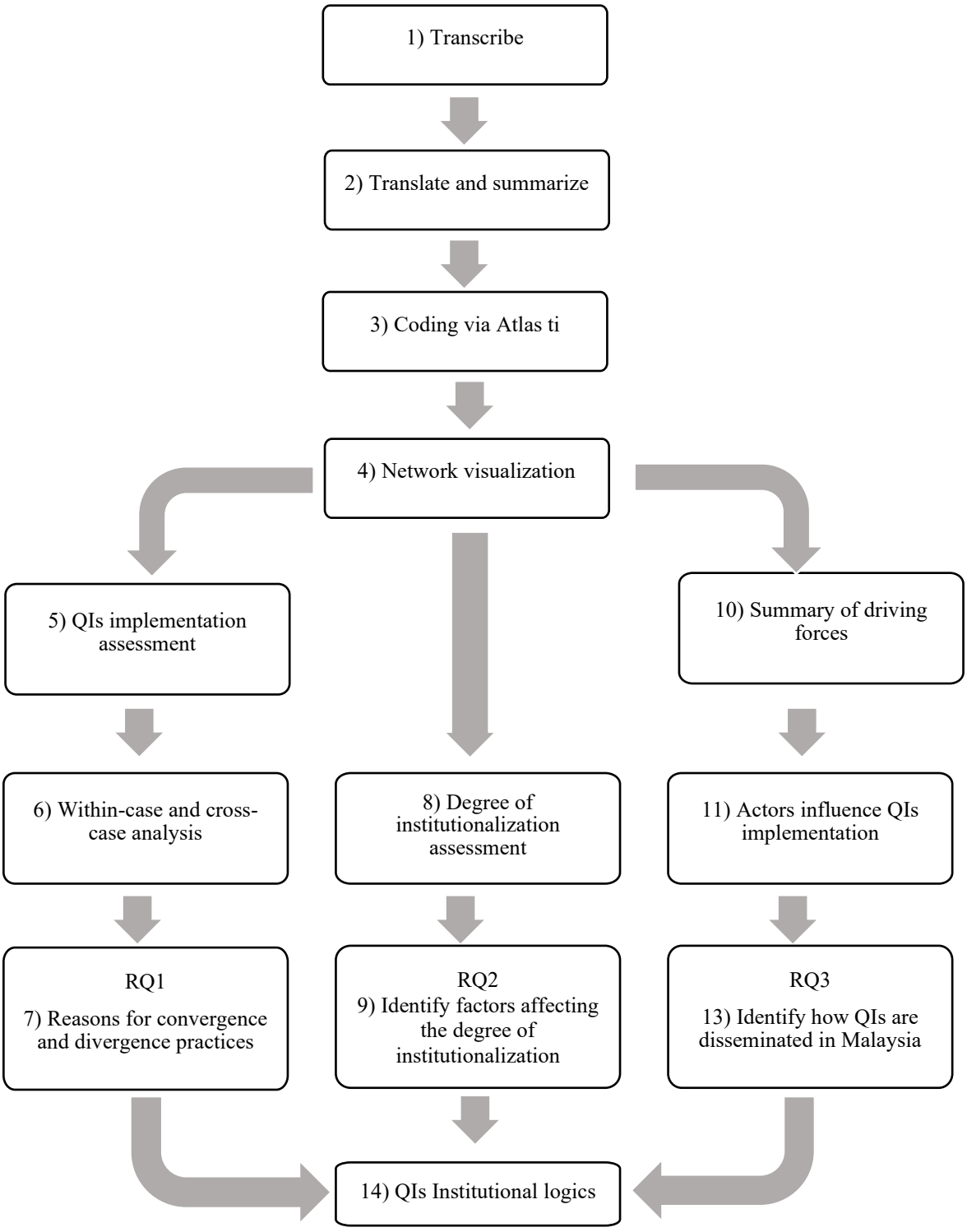
Table 3. 9. *Summary of government agencies and education entities*

Agency	Ministry	No. of interviewee(s)	Designation	Interview/Discussion duration (hours)
Training center (MPC)	MITI	5	Director, Deputy Director, Senior Manager, Assistant Manager & Program Officer	3.50
Research center (SIRIM)	MITI	1	Principal	2.00
Consultant (SME Corp.)	MEDAC	1	Senior Manager	1.25
Training center (CIAST)	MOHR	3	Director & 2 program coordinators	3.00
Vocational college (Shah Alam)	MOE	2	Head of Quality Assurance, Academician	2.00
University 1 (UPM)	MOHE	1	Former Head of Industrial Engineering	0.75
University 2 (UTM)	MOHE	1	Head of Industrial Engineering	0.75

3.7 Step 5 - Analyzing data: Within-case and Cross-case Analysis

Figure 3.6 depicts the general flow of the data analysis. Step one to step four was for data management. All the case study results were saved in the designated folder for records retention, which were divided into case study companies, and related agencies and education entities. The interview sessions were recorded and transcribed accordingly. The mediating languages used were both in English and Malay. For the purpose of the findings' standardization, all the information gathered during the interview and observation during site visit was translated to English and summarized. The summarized results were emailed to the interviewees for information confirmation.

Figure 3. 6. *Flow of Data Analysis*

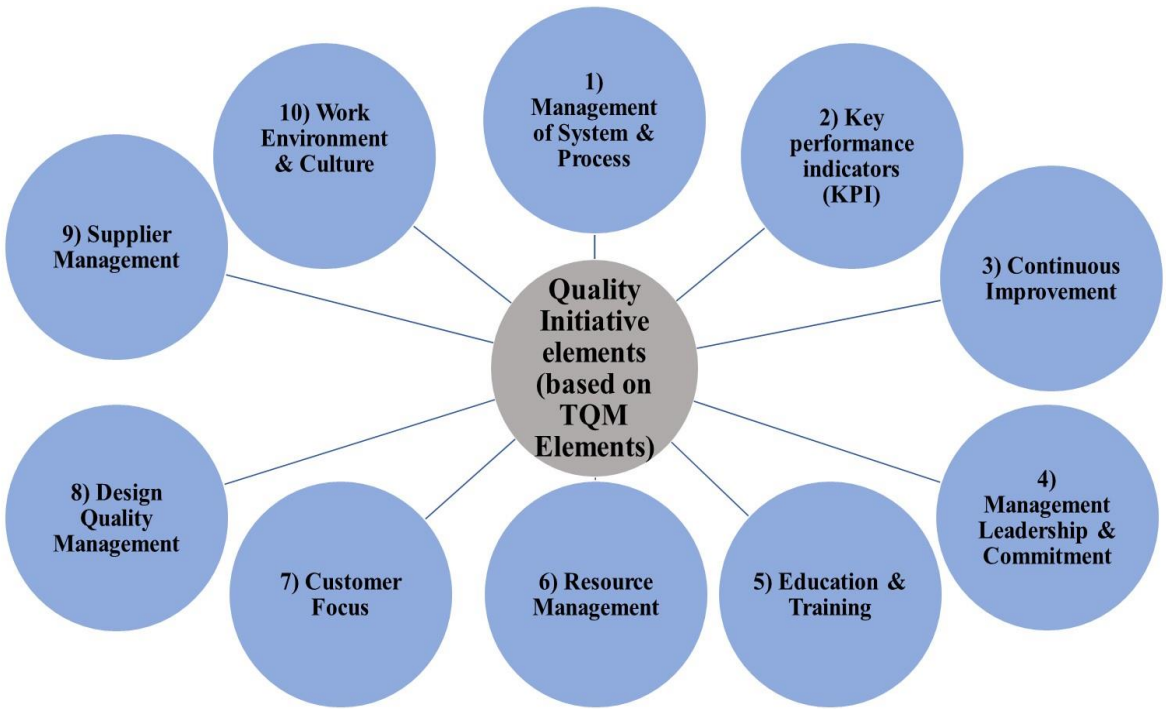


Note. Developed by the author.

All the summarized data from interview and observation were uploaded to ATLAS.ti for analysis. Related information was coded according to the relevant categories. There were 2,880 quotations with 166 codes generated in total for manufacturing companies. As for the government agencies and education entities, 421 quotations with 56 codes were identified. Once coded, relevant networks were derived for better visualization for analysis purposes (e.g., Appendix IV and Appendix V).

Step five to step thirteen were purposely designed to analyze and answer each research question which was divided into three sub-analysis. To answer RQ1 which was related to convergence and divergence practices, three analysis steps (step five to step seven) were involved. In order to systematically identify the convergence and divergence practices, the results were summarized in the QI implementation assessment, which consisted of ten summarized TQM elements (Figure 3.7). The elements for the work environment and culture were divided into employees' attitude and employees' involvement. Based on the assessment results, within-case and cross-case analyses utilizing radar chart were conducted to further investigate the implementation level within and between sectors. Based on the analysis, the reasons behind the convergence and divergence practices were further identified and summarized.

Figure 3. 7. *Quality initiatives elements based on TQM elements*



Note. Summarized by the author from the literature review.

Next was analysis to answer RQ2 which consisted of degree of institutionalization assessment and identification of factors affecting the degree of institutionalization (step eight and step nine). As for the level of institutionalization, five elements were evaluated based on adoption/entrenchment bases: models, culture, education, regulative, and technical (Zeitz et al., 1999). Within-case and cross-case analyses were then conducted for an in-depth understanding of the current institutionalization level.

Steps ten to thirteen were designed to answer RQ3 which was related to QIs dissemination. The analysis focused on driving forces, institutional pressures imposed, and relevant key actors who play a big role in QI dissemination. The analyses covered both the organizational and national levels of QI dissemination. As for the final step (step fourteen), the research propositions were then derived from the findings and visualized via QIs institutional logics diagram.

3.8 Conclusion

Research gaps were identified from the preliminary literature review conducted to narrow down the research questions. In order to get further insights, a critical review was conducted by reviewing relevant previous studies related to institutional theory studies conducted in the manufacturing industry. A few research themes and institutional theories derived from the studies conducted were identified. Based on the literature review conducted, a rigorous research method was utilized to guide the research journey, especially in collecting empirical data via interview and observation in manufacturing companies, government agencies, and education entities.

Data triangulation from multiples sources was done to enhance research quality and reliability. Detailed explanation of data analysis, establishment of research propositions, and comparison with existing literature will be covered in the upcoming chapters accordingly. The analysis in general covered both meso and macro analyses as an attempt to cover a broader scope of QI dissemination. Current situation of QI implementation, QI institutionalization level, and the way QIs are disseminated in Malaysia are among the pursued expected findings. Since the input of the research are both from academic and practitioners' perspectives, the research findings and outcomes are expected to have both academic and practical implications.

CHAPTER 4: ORGANIZATIONAL-LEVEL FINDINGS

4.1 Introduction

This chapter discusses the company background of each company case study especially in terms of QIs history and implementation practices and status. Table 4.1 summarized the manufacturing companies' history of QIs implemented and assistance received during adoption and implementation stage while Appendix IV shows the summary of the QIs experience of the case study companies extracted from Atlas ti. Further detail explanation is discussed in the next section.

Table 4. 1. *Manufacturing Companies History of QIs Implemented and Assistance Received*

Company	Brief history	Assistance received
JL1	Kaizen (GATE) Prior to 2001, GATE activity was originally implemented by Malaysia JL1 company counterpart. This activity had been spread all over JL1 group. Kaizen (ESS) In 2016, Kaizen was started after official announcement by management during assembly Lean manufacturing In 2017, JL1 established the continuous improvement department.	HQ, between sites
JL2	Kaizen Started from start-up	HQ, between sites
JL3	Kaizen In 2008, Kaizen implementation was started.	HQ, between sites, training provider
JM1	QIA Started around 1999. Kaizen Implemented quite a long time ago.	HQ
JM2	Kaizen In 1994, Kaizen implementation was started. Implement since from the beginning ABC chart In September 2018, JM2 requested consultant advise (Mr. XYZ.	HQ, MIDA, consultant
JM2	Aerospace Received fund from Malaysian Investment Development Authority (MIDA).	
JS1	Conducted Kaizen improvements but it is not officially gazetted.	HQ, consultant
ML1	ISO 9001 2007 – ISO 9001 implementation start-up. Established process mapping together with consultant. Others (e.g., SOP, education, management review) documentation established on their own. 2015 – 100% prepared by ML1 based on previous experience	External consultant

Table 4. 1. *Manufacturing Companies History of QIs Implemented and Assistance Received (Continued)*

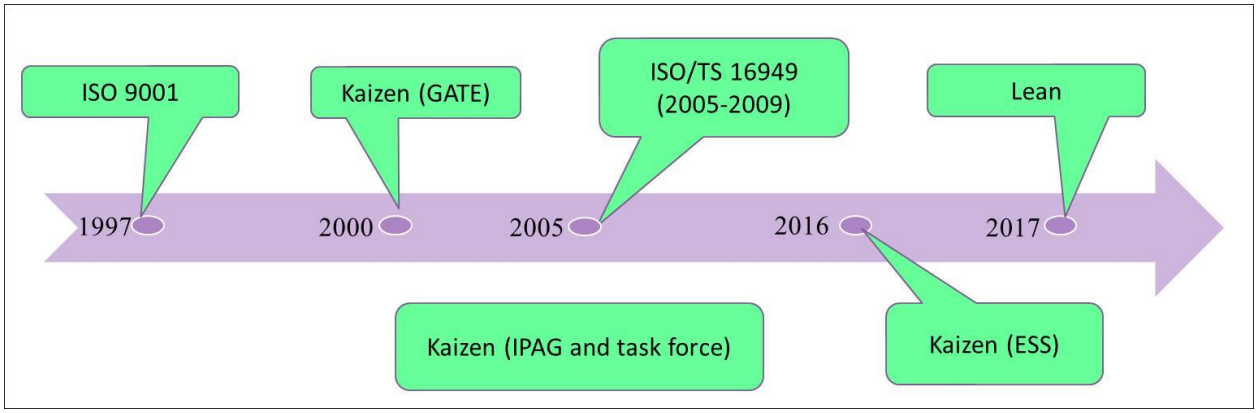
Company	Brief history	Assistance received
ML2	QCC 1999 – Started implement QCC due to competition organized by MPC. Have internal trainer to educate employees. Did not receive any assistance from MPC. 2000 - Became QCC champion for manufacturing sector in 2000. 2018 - The number of groups is very less due to downsizing. Six Sigma 2014 - Requested by one of the giant companies, IBM to conduct Six Sigma project. IBM just gave instruction without provide any assistant. It was up to ML2 to arrange and submit the projects according to their time frame.ML2 requested external trainer to conduct the Six Sigma training for related PICs. There are for about 10 people certified with black belt and around 3 people for green belt.	Internal trainer External trainer
MM1	ISO 9001 MM1 frequently engage with a consultant through related training and guidance. Lean Lean is not fully implemented. However, the employees are trained by QA Manager and equipped with basic knowledge on how to conduct improvement based on the lean concept. Fraunhofer and SIRIM program 2015 - Working with SIRIM and received lots of benefits such as received advise during the audit, invitation for training and talk etc	External consultant Internal trainer, Government agency (SIRIM)
MM2	QIs (e,g, Six Sigma, Lean, Kaizen) 2008 – Proposed by VPQHSE. Conducted internal training by QIs coordinator and VPQHSE. 2014 – MPO project conducted by external consultant Others Equipment fund by government (SME Corp. under MIDA) Some suppliers are more expert. Received indirect knowledge assistance from suppliers	Internal trainer, external consultant, government agency (SME Corp) and Suppliers
MM3	QCC and Kaizen QA manager studied the QCC and Kaizen concept himself and tried to improve by utilizing those concepts. Then, the QA manager requested related training by inviting external consultant.	External consultant
MM4	ISO 9001 2010 - Engaged with a consultant during ISO 9001 implementation process. Conducted in house training by utilizing external training providers.	External consultant, external trainer
MS1	ISO 9001 (2013) and API (2014) Lean 2015 – Received government grant and 12 months contract with MPC to execute the Lean improvement program. Joined Creanova Lean programs and won for Malaysia category.	Government grant, government agency (MPC)
MS2	ISO/IATF 16949 MS2 consult and conducted training with the help from external consultant. External auditors advise and teach MS2 on how to combine everything into one audit plan.	External consultant, auditors

Table 4.2 listed the QIs implementation level assessment criteria. Based on the evidence and implementation status observed, Table 4.3 and Table 4.4 reports the QIs implementation level assessment results of 10 QIs elements practices for Japanese and Malaysian companies. The assessment systematically summarizes the QIs implementation in order to identify convergence and divergence practices between both the Japanese and Malaysian companies. Furthermore, further understanding of the reasons why there are divergence practices even when the companies are operating within the same organizational field are clarified.

4.1.1 JL1 QIs History and Implementation Status

JLI implemented various QIs such as ISO 9001, Kaizen (in-process abnormality group (IPAG), Group Activity Towards Excellence (GATE), and employees' suggestions scheme (ESS)), and Lean, as depicted in Figure 4.1. JL1 was certified with ISO 9001 in 1997. Previously, between 2005 and 2009, JL1 implemented ISO/TS 16949 because JL1 management was under Kameyama plant. However, JL1 headquarters (HQ) changed to Toyohashi plant, afterward. Since JL1 is not a direct supplier for automotive and taking into accounts the advice received from HQ, JL1 decided not to apply for the certification anymore. However, JL1 still maintained some of the ISO/TS 16949 implementation because it does give benefits to JL1.

Figure 4. 1. *JL1 QIs history*



Note. Summarized by the author.

Table 4. 2. *QIs Implementation Level Assessment Criteria*

No	Elements /Factors	Low (1)	Moderate (3)	High (5)	Reference
1	Management of system & process	If the practices were not integrated into the existing processes.	If the practices were partially integrated into the existing processes.	If the practices were integrated into the existing processes.	Ivanova et al. (2014)
2	Key performance indicator (KPI)	If there was no KPI or quality index monitoring in place and no changes were observed so far or expected in the future.	If there was KPI or quality index monitoring in place and the changes were expected but not observed yet.	If there was KPI or quality index monitoring in place, the organization experienced a positive change because of the implementation.	Ivanova et al. (2014)
3	Continuous improvement	If there was no activity to encourage continual study and improvement of products, services, and processes.	If moderately encouraged continual study and improvement of products, services, and processes.	If encouraged continual study and improvement of products, services, and processes.	Fuentes et al. (2006)
4	Management leadership & commitment	If the managers were not supportive, did only "lip service" to the standard, and did not support the implementation efforts by providing time and resources.	If the managers supported the implementation, provided time and resources for the implementation process. However, managers did not actively involved in the implementation process.	If the managers supported the implementation, were involved in the implementation process, and provided time and resources for the implementation process.	Ivanova et al. (2014)
5	Education & training	If training was not properly provided.	If adequate training was provided accordingly. However, internal trainers were not available.	If adequate training was provided accordingly and internal trainers were available.	Fuentes et al. (2006); Singh and Ahuja (2014)
6	Resource management	If no 4M (e.g. computerized systems) were used in the process.	If partial 4M (e.g. computerized systems) were used in the process.	If proprietary 4M (e.g. computerized systems) were used in the implementation processes.	Ivanova et al. (2014)

Table 4. 2. *QIs Implementation Level Assessment Criteria (Continued)*

No	Elements / Factors	Low (1)	Moderate (3)	High (5)	Reference
7	Customer focus	If no actions were taken to capture customers' requirements, reduce complaints and increase customers' satisfaction.	If measures were taken to reduce complaint and increase customers' satisfaction. However, there was lack of activities to capture customers' requirements.	If measures were taken to capture customers' requirements, reduce complaints and increase customers' satisfaction.	Miyagawa and Kosaku Yoshida (2010); Fuentes et al. (2006)
8	Design quality management	If there was no product/process design quality management in place.	If there was product/process design quality management in place. However, the review was not conducted thoroughly with cross-functional department.	If design quality management was in place with dedicated extra effort, such as conducted a thorough review of new product design with cross- functional department. Considered both quality and productivity during the product and process design.	Miyagawa and Kosaku Yoshida (2010); Kim et al. (2012)
9	Supplier management	If implemented arm's length supplier relationship.	If partially providing guidelines and advice but not reaching a collaborative supplier relationship level.	If implemented a collaborative supplier relationship.	(Miyagawa & Yoshida, 2010)
10	Work environment and culture- employees attitude	If employees were not supportive and were skeptical about the benefits of the standard.	If the employees were skeptical at first but supportive later in the process.	If the employees were supportive of the implementation.	Ivanova et al. (2014)
	Work environment and culture- employees involvement	If the employees did not follow the procedures, there was no cross-functional discussion and appropriate channel to share opinions and ideas.	If the employees sometimes followed the procedures and there were cross-functional discussions, channel to contribute opinions and ideas were sometimes available.	If the employees were using the system on a daily basis and there were cross-functional discussions and channels to contribute opinion and ideas were frequently available.	Ivanova et al. (2014); Fuentes et al. (2006)

Table 4. 3. *QIs Implementation Level Assessment (Japanese Manufacturing Companies)*

Elements / Factors	JL1	JL2	JL3	JM1	JM2	JS1
Management of system & process	Have special committees to manage the GATE and Kaizen programs. IPAG meeting was conducted every week while task force will be established if any difficult issues were resolved.	Have a fixed schedule (once a year for 4 months) to conduct the QCC project. Fine-tune the QCC, whereby the participants from individual departments were changed to mixed departments. Kaizen was conducted on ad-hoc basis by individual department.	Monthly reward for Kaizen suggestion and yearly grand presentation for Kaizen at group/HQ level. Established a committee from each department to coordinate the improvement activities.	There was a committee for Gemba Kaizen and monthly mentoring sessions. Formed a QIA committee to conduct improvement based on customers' complaints.	Kaizen was conducted on an ad-hoc basis. QRQC were focusing on internal rejection while ABC chart is for external rejection. FM's responsibility for selecting the QRQC improvement items. There is a PIC to update and monitor the ABC chart.	Not officially implemented Kaizen. Conducted improvement on ad-hoc basis. No PIC to monitor the improvement status.
Points	5	4	5	5	4	1
Key performance indicator (KPI) (measurement and feedback)	Departmental objectives and quality index were presented and monitored regularly. Some of the targets still cannot be achieved due to a tight target. The rejection rate showed a decreasing trend, however there were still some recurrences occurred.	KPIs was presented and monitored regularly by individual department. Some of the targets still cannot be achieved due to a tight target. The rejection rate showed a decreasing trend.	Monitored via quality management target based on departmental target and presented during management review. Ideal case is zero defect, but it is quite impossible to achieve zero defect. There were many problems, but tried to improve gradually.	Monitored based on departmental target. The rejection rate showed a decreasing trend but some of the targets still cannot be achieved due to a tight target.	The monthly KPIs result was reported quarterly during management meetings. There is no need to report every month because it is covered during ABC chart weekly meeting. The rejection trend seemed slightly better but cannot improve drastically due to capability limitation of old machines.	Monitored the target on monthly basis and status reported during monthly and management review meetings. The results look good. However, there were some outflow cases due to human error.
Points	4	4	4	4	4	4
Continuous improvement	Encouraged continual study and improvement via various improvement activities, such as IPAG, task force, GATE and Kaizen competition, Lean and horizontal deployment between sites.	Some improvement activities were conducted (e.g. remove dust for spray parts) and horizontal improvement implementation were carried out on different parts.	The index was monitored monthly. If cannot achieve target, the respective PICs need to find the root causes and propose countermeasures. Conducted competition between Malaysia business group.	Improvement conducted based on employees' experience. Implemented improvement based on customer's complaint and target action plans.	Maintenance staff worked in JM2 for quite a long time and were able to conduct some improvements (DIY). Most of the improvement were conducted based on internal and external rejections.	Improvement was conducted based on an ad-hoc basis. The improvement activities became inactive because the PIC had resigned.
Points	5	4	4	3	3	2

Table 4. 3. *QIs implementation level assessment (Japanese manufacturing companies) (continued)*

Elements / Factors	JL1	JL2	JL3	JM1	JM2	JS1
Management leadership & commitment	Managers and top management gave a full commitment. Top management was involved in patrol, joined various meetings and allocated relevant budget and necessary resources. There is an award system and various activities to increase employees' motivation.	Management gave very good support (e.g. allocated budget for necessary training). QCC team was decided by top management. There were some incentives to reward employees but sometimes it became an issue because the incentives were quite small.	Received full support from top management, such as giving recognition. HQ requested for improvement activity presentation to the HQ (started last 3 to 4 years)	Managers and top management gave a full commitment. Top management frequently joined the meeting.	Management was very supportive and took the lead in quality improvement activities. They even joined various meetings, patrols and observed the situation.	Management was very supportive. They joined the related meeting and closely followed up on the status. They have lots of experience and were able to advise regarding the technical aspects.
Points	5	4	4	4	5	5
Education & training	JL1 implemented a cultivation system to educate employees with relevant knowledge, such as QC tools and design review. There were internal trainers available to train the employees.	Plan to establish a new department called a system department which mainly focuses to train the employees. So far, there has been no training for QCC participants. The employees will learn while conducting the improvement activities. Provided related training for ISO system.	A Group Malaysia training center available to provide various training topics, such as soft skill training, production planning and ISO. Special course training will be provided by training providers.	JM1 seldom utilized special tools, such as DOE because the employees do not have the skills.	Have employees' skill map and skill metrics. Management would allow training if the training covered by HRDF.	HQ provided necessary training (e.g., new model). HQ will assist, especially on technical aspects. Utilized HRDF to provide related training to employees.
Points	5	3	5	3	3	3

Table 4. 3. *QIs implementation level assessment (Japanese manufacturing companies) (continued)*

Elements / Factors	JL1	JL2	JL3	JM1	JM2	JS1
Resource management	Provided relevant databases to control and manage the system, such as E-DMS, Hibidoutai, QUICS and COMPASS.	Provided related equipment and training when necessary.	Provided related training and equipment. The documents were still under control manually and they were not uploaded into the server due to confidentiality reasons.	Main resources are people. There was not much investment in databases and equipment.	Provided branded, expensive and high equipment reliability . MRP and barcode system were available but employees seldom utilized it. Employees were only well versed in using Excel.	Provide necessary training and equipment. Only have a database for account system and stock control.
Points	5	3	3	3	3	3
Customer focus	Captured customers' requirements during design and development stage and involved various departments such as marketing, sales and technical support center. Utilized COMPASS system to capture relevant laws and regulations updates. Customer return were monitored and resolved in a timely manner.	JL2 has a procedure to compile feedback from customers. However, JL2 did not develop a new product. The products were based on customers' requirements, whereby JL2 will receive drawings from customers and prepare prototypes for customers' approval.	Conducted a yearly survey and captured customers' feedback via customer improvement requisition, whereby customers would key in the requisition in the database and related PIC would receive the report.	Conducted a yearly survey.	Monitored customer complaints closely via ABC chart monitoring. Received drawing from customers.	Make to order products and based on project. Conducted a yearly survey.
Points	5	4	4	3	4	3
Design quality management	There is R&D department. Design management was in place. Utilized QFD, FMEA and cross-functional discussion, such as design review meetings.	The products were based on customers' designs. JL2 did not develop new product. Conducted testing for customers' approval.	Conducted new product development. Shared know-how between group members.	There was no design process. Management would not invest anymore. Besides, the products were very simple and could be produced based on drawings and customers' specifications.	There was no design process because the products were based on customers' design (excluding design scope). Conducted a feasibility study.	Heavily relied on HQ. The drawing and approval for new product development was under HQ control.
Points	5	3	5	3	3	2

Table 4. 3. *QIs implementation level assessment (Japanese manufacturing companies) (continued)*

Elements / Factors	JL1	JL2	JL3	JM1	JM2	JS1
Supplier management	Requested suppliers to be certified with ISO 9001. Provided advice and guidelines as and when necessary.	Did not request suppliers to be certified with ISO 9001. Less management of suppliers because customers will provide the raw material.	Did not specifically mention that suppliers must be ISO certified. However, JL3 wanted suppliers to be certified with ISO 9001. JL3 did not have an incoming QC and relied on suppliers to provide COA and quality raw materials based on trust. Conducted audit and requested suppliers to fill in the supplier's assessment questionnaire.	Did not request suppliers to implement Kaizen. Will request suppliers to be certified with ISO 9001 in the future. Evaluated suppliers based on a monthly evaluation. Raw material as recommended by HQ.	Encouraged suppliers to implement the quality improvement program through a yearly self-evaluation. JM2 did ask whether suppliers were certified with ISO or otherwise. However, not all suppliers were certified. JM2 engineers will visit suppliers and help suppliers to resolve the related problems.	Requested suppliers to be certified with ISO 9001. Conducted suppliers audit. HQ sometimes joined the supplier audit.
Points	3	1	3	3	5	3
Work environment and culture-employees attitude	Some of the employees felt that ISO 9001 system presented inflexibility. However, employees' awareness and understanding increased and realized the benefits gained from the QIs implementation.	Teamwork was very good. However, since 75% of the manpower were foreigners, the communication was difficult, and the turnover rate was high.	Employees were more efficient and had more awareness related to quality problems. Employees had a positive attitude and were not reluctant to conduct improvement.	Employees did not issue the request form because the PICs must revise or take actions accordingly once recorded. There might be a little bit of culture change in terms of awareness.	Employees' awareness increased. Some employees may feel reluctant to do the jobs but are still doing it. Some of employees did not utilize the system provided (e.g. MRP)	Employees awareness increased. However, gradually they will forget.
Points	4	3	5	3	3	3
Work environment and culture - employees involvement	The employees' participation increased. Employees were able to channel their opinion via department and cross-functional meetings and CI improvement activities.	QCC team was decided by top management. Kaizen was based on department, and all staff needed to participate. Have departmental daily meetings.	Employees involvement were depended on the job scope. Employees were able to submit suggestions via Kaizen suggestion scheme.	Supervisor and above were involved in QIA. Gemba Kaizen participation was mostly from operators.	Operator may involve in QRQC improvement activities. HODs gave opportunities for operators to present their improvement activities. However, employees had fewer chances to channel their opinion and ideas.	Received many feedbacks from supervisor level and seldom received feedbacks from operators. There was less cross-functional discussion and appropriate channels to share opinions and ideas.
Points	5	4	4	4	3	1
Average	4.64	3.36	4.18	3.45	3.64	2.73

Table 4. 4. *QIs implementation level assessment (Malaysian manufacturing companies)*

Elements / Factors	ML1	ML2	MM1	MM2
Management of system & process	The improvement activities were under each of related department responsibility.	Conducted small group activities based on direction from ML2 management. Changed focus from based on project to cost-saving improvement.	Improvement was conducted based on customers' complaints and arising issues.	Needed to write reports and the reports were presented during a monthly meeting. Management will decide which issues to be tackled and assigned PICs.
Points	3	4	3	4
Key performance indicator (KPI) (measurement and feedback)	Quality objectives were monitored based on department. A 6-monthly update during meeting. Created action plans and countermeasures. A decrease in rejection trend indicating an improvement in effectiveness.	Quality objectives were monitored based on department. ML2 was capable to produce multiple products and became suppliers for big multinational companies.	Quality objectives were monitored based on department. Rejection trend had decreased (e.g. customers' complaints).	MM2 did not calculate the cost saving for Lean and Kaizen. However, MM2 did calculate for Six Sigma and "just do it" improvement. There were KPIs for ISO as well. There were lots of benefits gained, such as cost-saving, knowledge gained and streamlined operation.
Points	4	4	4	4
Continuous improvement	Tied with quality objectives. ML1 conducted investigation based on 4M category.	Tied with quality objectives and daily issues. Focused improvement on critical problems.	Continuous improvement conducted by a cross-function department (e.g., engineering, QA and production). Utilized Lean and Kaizen improvement methods.	The system is there but inactive because the PICs have already resigned. There were MPO activities to optimize production operation.
Points	3	3	3	2
Management leadership & commitment	Management will support in terms of resources. There was no frequent meetings or reward.	Management was willing to invest and allocate time and budget for the improvement activity. Will reward employees (ESS and QCC) if they make a good improvement.	Full support from the management because management were from manufacturing background and had a diversified experience.	Top management commitment focus shifted from quality to delivery and profit making. Lack of appreciation shown during meeting for the improvement conducted.
Points	3	4	4	2
Education & training	Provided related training and implemented a buddy system.	Provided related training accordingly. Have a designated internal trainer.	Provided related training. Managers had a diversified improvement experience and managed to train and guide employees.	Provided related training. Managers had a diversified improvement experience and managed to train and guide employees.
Points	3	4	4	4

Table 4. 4. *QIs implementation level assessment (Malaysian manufacturing companies) (continued)*

Elements / Factors	ML1	ML2	MM1	MM2
Resource management	Provided time allocation for employees to attend training. There was no database or equipment allocated for the improvement activities.	Resources provided based on 4M and depended on project (e.g., Six Sigma required Minitab software).	Most of it was spent on people. Related information (e.g., rejection and ISO procedures shared in a public server)	Did not allocate budget to hire new improvement coordinator.
Points	2	4	3	2
Customer focus	Conducted surveys for selected customers.	Conducted customer surveys. Certified with various systems and UL to show customers ML2 capability.	Captured customers expected requirements during exhibition. Captured customers' feedback based on customers' complaints and surveys.	Conducted customers' satisfaction survey and created countermeasure if the feedback was below 3.
Points	3	4	3	3
Design quality management	Product development process was available However, from the PIC's perspective, to make a new tape was rather impossible because market share became constrained and saturated.	Product development process design was available. Prepared and submitted various documents to customer, such as FIA, APQP and PPAP.	Conducted research to produce desired LED products. Collaborated with SIRIM and Fraunhofer.	Based on project. Conducted kick-off meetings and reviewed related requirements with related departments. Prepared various documents and testing based on customers' requirements.
Points	2	4	4	4
Supplier management	ML1 did not educate suppliers because the industry is saturated and did not request suppliers to be certified with ISO 9001.	Requested suppliers to be certified with ISO 9001. Audited suppliers based on the standard audit checklist.	Requested raw material suppliers to be certified with ISO 9001.	Requested suppliers to be certified with ISO 9001 but it was not mandatory. Gave suggestions to implement QIs program.
Points	2	3	3	3
Work environment and culture-employees attitude	Positive change from hectic to a more structured and systematic. Employees depended from managers input to related procedures and requirements.	Employees seemed to have a positive attitude, whereby they knew that they needed to conduct improvement in order to survive.	Once employees attended the basic Kaizen and Lean training, they tried to identify the problem in the process.	The PICs were quite busy. Therefore, they gave less cooperation if the QIs is driven by QA. However, they gave better cooperation if it is driven by the CEO.
Points	3	4	4	2
Work environment and culture - employees involvement	Involvement was around 80% because there were foreign workers. The opportunity for a cross-functional discussion and shared opinions was very less.	Anybody can submit suggestions for ESS. However, company will nominate related participants for Six Sigma and SGA projects.	Employees can give ideas to management through their superiors. The improvement program already integrated with the ISO system.	All employees were involved but most of it was from the middle level. Have a cross-function discussion but those from the lower levels may not have an official channel to give suggestions.
Points	2	4	3	3
Average	2.73	3.82	3.45	3.00

Table 4. 4. *QIs implementation level assessment (Malaysian manufacturing companies) (continued)*

Elements / Factors	MM3	MM4	MS1	MS2
Management of system & process	QA will decide whether the problems need to be resolved via Kaizen or otherwise. There was a PIC in charge of Kaizen.	Have a weekly meeting joined by MD and various departments. PICs will highlight any arising issues. Management will decide which issues to be tackled.	Management requested for each HOD to have an improvement team. For small budget activities, MS1 can implement right away.	The progress was monitored via a monthly meeting and management review meeting twice a year.
	3	4	3	3
Key performance indicator (KPI) (measurement and feedback)	Monitored performance via quality objectives. Rejection was decreased, but the lesser rejection may be due to improvement conducted or fewer orders.	Monitored performance via quality objectives. Quality performance was maintained with a minimum rejection rate.	Established KPIs based on customers' requirements. There seemed to be no KPI for company monitoring. Rejection was very low (one occurrence) because MS1 products were very expensive.	Each department had their own KPI. KPI result was reported in a monthly basis by HR. KPI dashboard was utilized to monitor the performance.
	3	4	2	4
Continuous improvement	Improvement based on ISO procedures. Kaizen was an extra activity.	Recently formed CI team from various departments (e.g. QC, production engineering to reduce rejection rate).	Improvement was conducted based on the Lean projects. The employees conducted other improvements, but it was not official.	Improvements were conducted based on KPIs action plan.
	3	3	2	3
Management leadership & commitment	Management will support in terms of resources. There was no frequent meetings or reward.	Management supported the improvement activities and involved in the improvement activities, provided time and resources for the improvement activities.	Management gave full support. The COO was very keen, helpful and very concerned with the improvement and even joined the workshop training.	There was management involvement in quality improvement program implementation. MS2 has a good culture and focused to meet the objectives.
	3	4	5	4
Education & training	Provided related training accordingly. More emphasized on OJT. External training usually for administration and office staffs.	Provided related training accordingly. However, there was no designated internal trainer.	Provided related training to employees. Hired MPC as consultant to guide the implementation. However, there was no internal trainer with the adequate skill to guide the employees.	Provided related training to employees. Hired consultant to train the employees. Examples of training provided were MSA, SPC, FMEA, PPAP and APQP which were related to IATF 5 core tools.
	3	3	4	4

Table 4. 4. *QIs implementation level assessment (Malaysian manufacturing companies) (continued)*

Elements / Factors	MM3	MM4	MS1	MS2
Resource management	Based on required actions for corrective actions. Did not use any particular software for analysis or document control.	Provided related database (e.g., paperless system). However, the company is still in the early stage to implement a barcode system. Allocated resources and provided necessary equipment.	Provided related training to employees. If there are new addendum changes, MS1 will follow accordingly. Saved all the documentation in a server/google drive.	Provided resources, mainly on training and database such as Minitab. Hired external program developer to develop OSTENDO system. As for document control, it was still controlled manually and saved into the server.
	2	3	3	5
Customer focus	Conducted customer survey every year.	Requested customer to give MM4 performance on a monthly basis.	Gathered information via customer's satisfaction form and plan for improvement.	Sales and marketing will frequently visit customers to hear their voices and requirements. They will record the information in CIAF system for R&D further reference.
	3	3	3	5
Design quality management	Conducted test run based on customers' specifications. There was no product development or R&D department.	Product development process design was available. Prepared and submitted various documents to customer, such as FAI and readiness report.	The design was based on API standard. The design cannot be changed plainly. Improvement were more focused on machining process.	MS2 received 30 to 50 customer requests every month. MS2 will filter and prioritize due to limited resources.
	2	4	3	4
Supplier management	Ta-Win requested suppliers to be certified with ISO.	Management of suppliers was quite simple because MM4 purchased tools only. Minimum requirement is for suppliers to have QMS, but ISO certified is desirable.	MS1 requirements for suppliers was based on API requirements. Almost 99% of the suppliers were certified with ISO.	Currently, more than 80% suppliers are certified with ISO. Minimum requirements for IATF are that the raw material suppliers must be certified with ISO. Currently, MS2 requested suppliers to plan to be certified with ISO.
	3	3	3	3
Work environment and culture-employees attitude	Cannot maintain the culture due to foreign workers. Operators tend to forget the condition after a few months.	There were no clear procedures before ISO implementation. Once ISO was implemented, clear procedures were established and everybody able to follow the procedures.	There was some cultures difference, but it was not reaching the level needed. They knew to apply Lean to improve the process, however they were somewhat lazy to go through the whole improvement process.	Environment in MS2 was very good. The top management showed a good culture which encourage openness and avoided office politics. Employees will discuss solutions together in a positive manner to achieve the objectives.
	2	4	2	4
Work environment and culture - employees involvement	Involved operators to get ideas. The opportunity for a cross-functional discussion and shared opinions was very less.	The involvement level for the quality improvement program was more to the CI team. However, the team members have difficulties due to a tight schedule. The opportunity to share opinions for a lower level was very less.	Conducted improvement on a daily basis. Management will ask employees to participate in their improvement projects.	Enforced employees to get involve whenever possible. Have a cross-function discussion, but the lower level may not have an official channel to give suggestions.
	2	2	3	3
Average	2.64	3.36	3.00	3.82

JL1 implemented Kaizen in company-wide, which covers the management group, and individuals. For management level, JL1 conducted in-process abnormality group's (IPAG) weekly meeting to discuss related internal rejection issues because there were still many production process problems such as recurrent problems. During such meeting, the cross functional members (e.g., QA, production, engineering, and logistics) would discuss in detail the in-process abnormality.

Then, the members will gather information, discuss the improvement plan, what are the countermeasures and whether the countermeasures are enough or not. The ultimate goal and intention for this activity is actually to improve the yield, productivity and improve the customer return. Furthermore, there is also a short-term activities called task force. The direction to make a task force is from top management. HR department will issue an official letter from Top management to the assigned task force members. For example, currently JL1 has stock reduction task force established where the members involve are nominated by the relevant head of departments (HODs). The involvement from the HODs is necessary in order to give them direction and decision.

GATE activities representing Kaizen group level in JL1 and were conducted prior to 2001 as the result of imitation (mimetic pressure) from JL1 counterpart business group. These activities have been spread all over JL1 business group and have become periodical official event, such as GATE competition. JL1 established an official GATE organization and the GATE committees were selected from each respective department. As for ESS Kaizen, the idea was originated from the local employees' intention to improve JL1 performance further. The ESS program was officially launched in October 2016 after the management made an announcement at the assembly. Previously, the improvement program was focused on the big improvements-related activities and lacked small improvement-related activities. Therefore, the main reason to include ESS Kaizen as one of the QIs was that JL1 wanted to increase and cover small improvement activities as well. The Kaizen improvement can be conducted in short duration from 1 to 3 months and the suggestions can be from an individual or group. It is believed that from the small improvements, it can be an impetus to a bigger improvement later on.

The ESS Kaizen activities are under GATE organization responsibility as well. Top management decides to conduct some competition and give award for these Kaizen activities on quarterly basis to motivate and increase employees' participation. The participants need to prepare the presentation material and display it on the noticeboard. Subsequently, the JL1 top

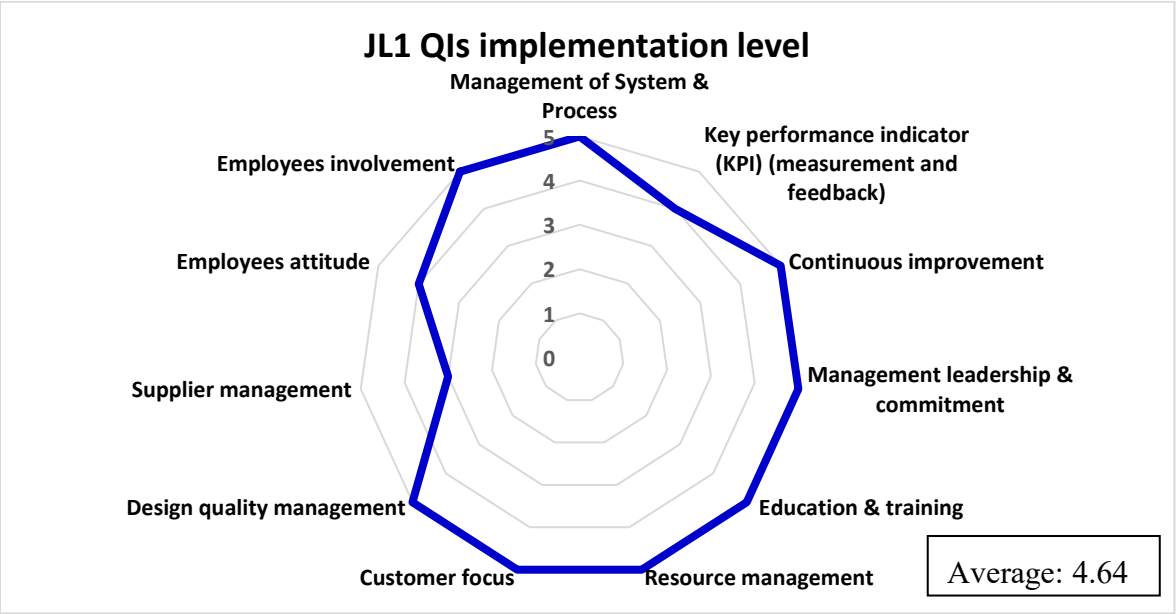
management reviews and evaluates the presentation material and decides the winner. The rewards were RM700, RM500, and RM300 given in quarterly basis, respectively. There is no limitation for the number of participant members. The first winner team upgrades to the GATE activity and competes in South-East Asia. All the improvements are registered under Kaizen activities and the improvement activities can be under quality, environment, or safety and health aspect. All these activities would increase the employees' motivation. Therefore, the employees are anticipated to deliver innovative ideas for process and product quality improvement.

JL1 is also involved in the South-East Asian group of Kaizen activities in charge by a group of committees. During the meeting, each company would share its Kaizen improvement activities and benchmark each other's practices. Besides, this group would share any improvement activities as and when needed via the global company database so that the group companies would able to study and apply horizontal deployment improvement activities.

JL1 established a continuous improvement department called OEE in 2017. This department was in charge of a few Lean activities. OEE members would study the whole production line, in the view of productivity and time. They conducted time study of each process and identified the wastes. Then, they would attempt to improve the process and make it as simple as possible. Eventually, the production time would be reduced and productivity would increase.

Figure 4.2 shows the overall QIs implementation in JL1 with an average of 4.64 points. Most elements were considered to achieve high level, except for supplier management, employees attitude and KPI. For supplier management, JL1 has provided guidelines and advice to suppliers but the relation still did not reach the collaborative supplier relation level. JL1 requested suppliers to certify with ISO 9001 standard. However, if suppliers have not been certified yet, they should submit a development plan. Else, they will not be qualified as one of the JL1 suppliers. This indicated that customer such as JL1 applies coercive pressures to suppliers in implementing the ISO 9001 system. As for employee attitude, some employees felt that ISO 9001 system presents inflexibility. However, employee awareness and understanding was increased and the benefits gained from the QIs implementation were realized.

Figure 4. 2. *JL1 QIs implementation level*



Note. Analyzed by the author.

With regard to KPI, JL1 established a mid-term plan (MTP) based on company's strategy to support operational efficiency such as cycle time study, supply chain management, stock management, outsource cost management and waste reduction effort. For example, each department will establish its own objectives and action plans so that all staffs correlate their personal targets to ensure that targeted objectives are within control and finally meets the objectives. One of the control methods is by practicing a monthly quality index review during the quality review meeting, which is attended by the top management, executives and engineers. However, some targets still could not be achieved due to the tight targets. The rejection rate showed a decreasing trend. However, some recurrence still occurred.

JL1 demonstrated high level of QIs implementation for other elements. For example, in terms of continuous improvement elements, the management encourages continual study and improvement via various improvement activities and horizontal deployment between sites. As for management leadership and commitment, it was evident that full commitment was received from the HQ in Japan and subsequently from the top management of JL1. Top management is anticipated to deliver a clear direction and decision in any occasion corresponding to quality improvement activities. Top management is even involved with quality and safety patrol. Besides that, management commitment is shown in terms of budget monitoring, whereby JL1 top management allocates certain budget based on the subordinates justification.

Regarding education and training, the most distinguished practice is that JL1 implements a cultivation system with relevant syllabus to educate employees on relevant knowledge such as QC tools and design review. Internal trainers are available to train employees. Furthermore, JL1 has assigned a PIC for every department as an education representative to identify relevant trainings, plans and conduct the training as per scheduled. As for resource management, JL1 established electronic database management system (E-DMS) for document control and easy access to relevant documents and procedures. Furthermore, Hibidoutai and QUICS databases are used for material movement and control. Statistical process control (SPC) online monitoring is utilized to control and monitor the product quality while COMPASS, which is a group of subsidiary companies, is utilized to share any latest or updated announcement, activities, policies and guidelines.

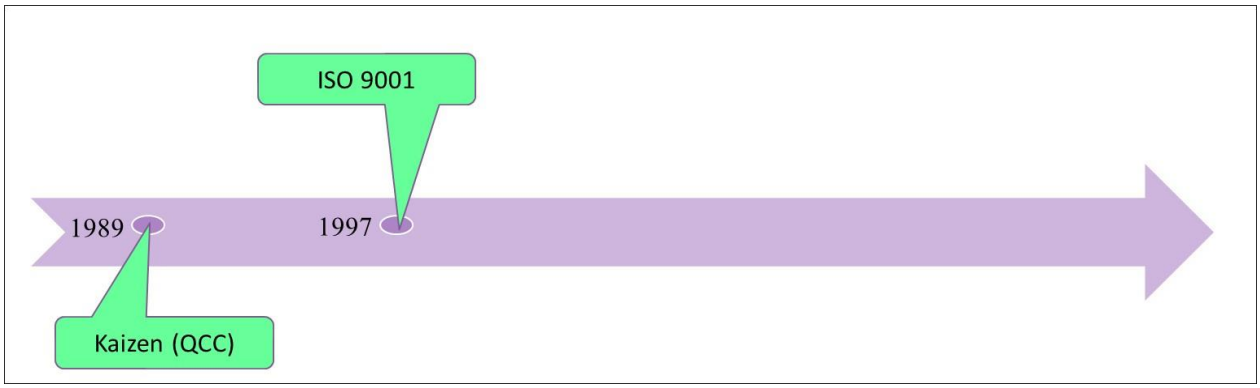
JL1 does not compromise in quality. Therefore, all the marketed products are monitored regularly and progressive counter measures are taken based on customers return feedback. Two methods are utilized in order to capture and compile the customers' feedback. The first method is by capturing the customers' requirements prior to design and development stage. The Marketing Department, Sales Department and Technical Support Center played important roles to explore new customer requirements, and then collectively discussed the situations with relevant PICs. The second method is considering the customer's new requirements. JL1 also takes into account the related laws and regulations involved. COMPASS system is beneficial in capturing any updates such as notification letters from HQ.

4.1.2 JL2 QIs History and Implementation Status

There are three initiatives that have been implemented by JL2 since the factory start-up; QCC, Kaizen, and 5S, as depicted in Figure 4.3. The QIs implementation is among one of the Daiho policies and all the companies have to follow them accordingly. So far, there is no new implementation since the interviewee joined the company in 2010. Kaizen is conducted in ad-hoc basis, while QCC is performed once a year within 4-months timeframe. The winner of QCC competition represents JL2 to participate in a yearly competition event among the business groups in Japan. Even though there is no reward for departmental Kaizen activities, the departments still incline to conduct the Kaizen improvement due to the facts that top management requires some updates regarding the improvement activities conducted. According to the assistant QA manager, the implementation of ISO 9001 is mainly due to customers' requirements and the company major intention to minimize rejection rates. As

evidence, the percentage of rejection returned to JL2 were reduced from 4% (2017) to 2% in 2018.

Figure 4. 3. *JL2 QIs history*

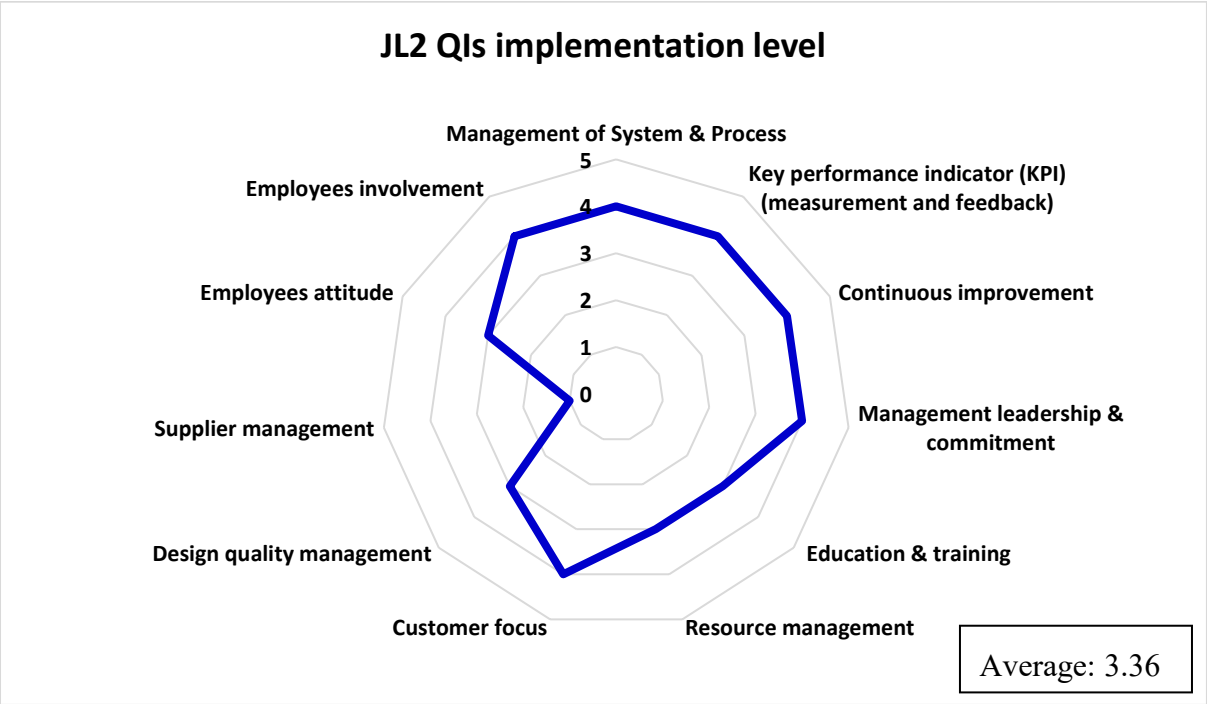


Note. Summarized by the author.

Figure 4.4 shows the overall JL2 QIs implementation level with an average of 3.36 points. Most elements received 4 points, except for education and training, resource management, design and quality management, supplier management and employee attitude. For supplier management, JL2 demonstrated a lenient control for supplier management. This maybe due to the fact that some customers have requested JL2 to purchase materials from dedicated suppliers, and they even provide materials directly to JL2. Since the materials are tested by the suppliers, there is no obligation for JL2 to perform any tests. Therefore, JL2 only seek certificate of analysis (COA) from suppliers for technical evidence, hence,it is unnecessary to put a strict control to the related suppliers. Therefore, customers definitely influence the JL2 supplier management practices.

Same goes to design quality management practices. JL2 does not develop new products because JL2 produces plastic injection moulding parts, in which the parts are based on customer designs. As for educational training and employee attitude, most operators in the production department are foreigners employed from private agents in order to overcome the domestic manpower shortage. This has resulted in high operator turnover rate; hence, JL2 faces difficulty in implementing empowerment and further enhance operators' knowledge with regard to continuous quality improvement in the production department. That is one of the reasons which contribute to JL2 difficulties in maintaining education and training as well as positive employee attitude. However, in order to improve the situation, JL2 will establish a new department called a system department which is mainly focused to train employees.

Figure 4. 4. *JL2 QIs elements implementation level*



Note. Analyzed by the author.

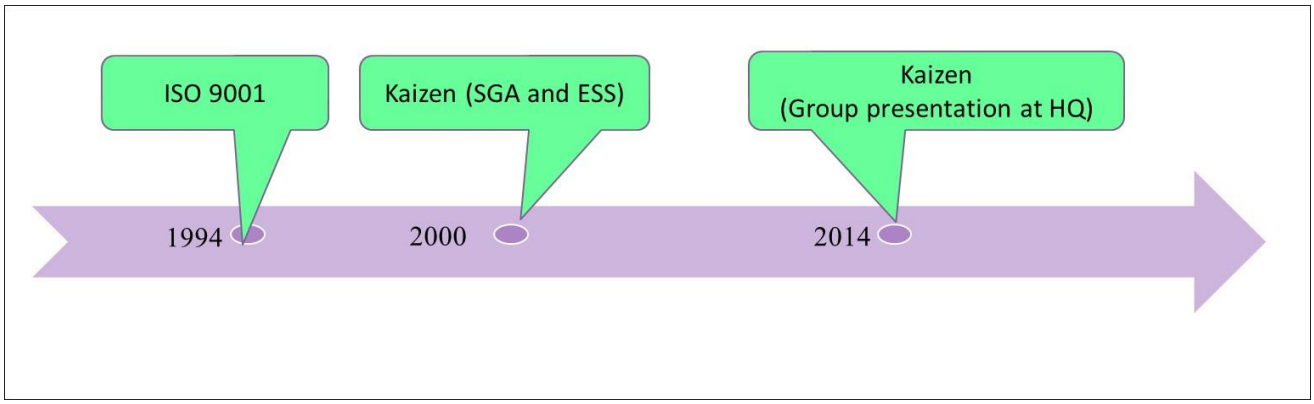
Meanwhile, JL2 demonstrated above moderate level for other elements. In terms of KPI, JL2 reviewed the KPI objectives in monthly basis, whereby all employees were able to access the department's KPI through the company's sharing folder system. Any achievements or project progress status were regularly updated in the KPIs report as a soft reminder for employees to continuously focus on KPI objectives. The KPI of JL2 mainly focuses on rejects reduction (Return of Goods (ROG)) by customer to 50% and zero-defect approach for all injection molding production parts.

Considering the important factors that contribute to the success of continuous improvement activities, JL2 emphasized the need to assign PICs to conduct various improvement activities and discuss cross-function improvement. Some improvement activities were conducted (e.g., improve dust for spray parts) and horizontal improvement implementation were carried out to different parts. Furthermore, the management commitment was considered high as evidenced through extensive internal and external trainings encouragement. JL2 ensures employees received the desired skills via personnel multi-skill monitoring. Each department has its own training lists that covers the related trainings needed. JL2 evaluated the achievement of all the trainees once a year. The evaluation method varies depending on each department.

4.1.3 JL3 QIs History and Implementation Status

Figure 4.5 shows JL3 QIs history and implementation status. JL3 had aggressively implemented Kaizen for the last 10 years and encouraged the employees to give suggestions and participate more in Kaizen activities. JL3 gives reward to motivate the employees. As a result, the employees have conducted more aggressive improvement activities for the last couple of years. In order to implement the improvement activities, JL3 received some guidelines from the HQ. Therefore, JL3 established a committee to monitor and coordinate the improvement activities, whereby its main coordination is under the safety and environment department. There is a person in charge (PIC) to coordinate the functions internally in each individual department. The improvement activities cover everything in the manufacturing including quality, safety, and environment, and example of improvements conducted were related to safety, cost reduction, higher capacity, more productivity, and cost saving.

Figure 4. 5. *JL3 QIs history and implementation status*

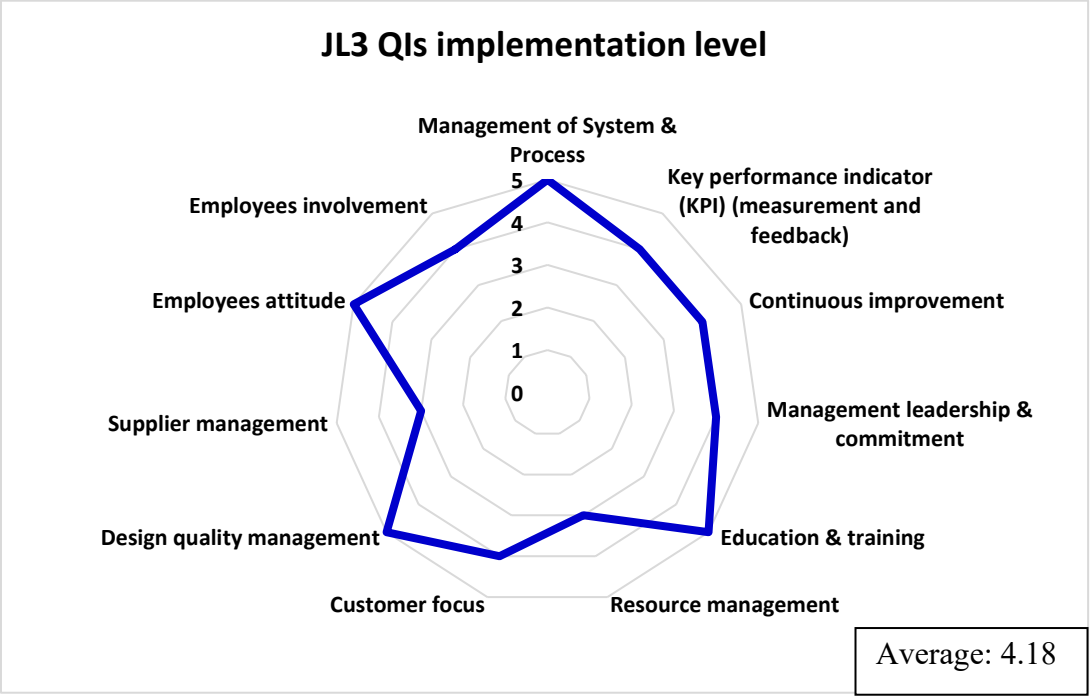


Note. Summarized by the author.

Figure 4.6 shows JL3 QIs implementation level with an average of 4.18 points. JL3 has strong points in management of system and process, education and training, design quality management, and employees' attitude. However, JL3 implements moderate practices for resource management and supplier management. As for education and training, JL3 has a Group Malaysia training center to provide various training topics to employees such as soft-skill training, production planning, and ISO standard. JL3 has a high design management system that capable to conduct new product development and have the capability to share their knowledge between business group. Besides, the employees show positive attitude while facing the problems and making improvement by facts, identification, and verification via Gemba approach. The positive attitude is evident in the following quote:

"JL3 definitely faced some difficulties. But the difficulty is just a word itself. It is not an impossible task for JL3 to get zero defect, but we have to put in the effort to minimize it. Eventually, JL3 has to solve any problem whether it is difficult or easy. JL3 has to tackle the problems earlier in order to prevent it becoming a big problem."

Figure 4. 6. *JL3 QIs implementation level*



In JL3, the management fully utilizes the ISO 9001 system in setting-up and meeting-up with KPI objectives and subsequently, management's review to evaluate all the departments and individual performance at the end of the fiscal year. ISO 9001 is more appropriate for monitoring performance index for quality management because it involves accreditation. Kaizen is a sideline improvement activity because the implementation is dependent on the company's own initiatives and there is no extreme target stipulated. Therefore, the accreditation coerces and stimulates the desire to properly execute the implement as per ISO 9001 requirements. For JL3, the ISO 9001 system in the organization is very important to guide the management in delivering a full commitment to all employees. Therefore, the ISO 9001 system, management, and people are three inter-related resources that drive JL3 in achieving the success of the quality improvement program.

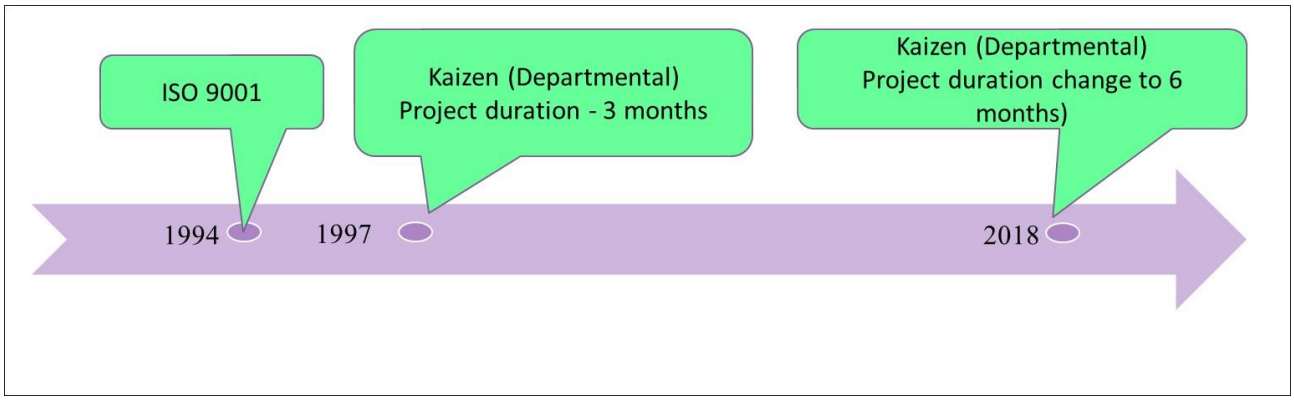
Moderate QIs implementation level was observed for resource management and supplier management, whereby for resource management, JL3 has provided employees with related trainings and equipment. However, the documents is still controlled manually and it is not uploaded in the server due to the confidentiality reason.

4.1.4 JM1 QIs History and Implementation Status

Figure 4.7 shows the JM1 QIs history and implementation status. As for JM1, the ISO 9001 implementation started in 1994 and JM1 adopted the ISO 9001 latest 2015 version in 2018. JM1 started the quality improvement activity (QIA) around 1999. There were lots of factors that motivated JM1 to implement QIA. One of it was due to various customer complaints. Besides that, some customers requested JM1 to submit the improvement activities. As a result, the Managing Director (MD) instructed JM1 to form a committee around that time and the improvement activities are still continuing until now. After JM1 formed the committee, the improvement activities were carried out properly. JM1 collect relevant data, devise the improvement plan and conduct a monthly meeting. Previously there were no such activities. JM1 will discuss, generate some improvement activities and submit when customers make a request.

There is a committee for Gemba Kaizen and a monthly mentoring session. JM1 started to implement the six months improvement time frame in 2018. From the first month, mentors (managers) would check all the improvement activities. All the improvement activities need to be finalized after the fifth month. The participants would need to present the results in the sixth month. Therefore, the Kaizen activities become like a project-based activity. The activities conducted were bigger and JM1 attempted to utilize the techniques more frequently. Previously, the time frame was three months and the activities were quite simple. With two months mentoring and one -month presentation of before and after the improvement. It seems that the impact for the three months activities were not very significant in contributing to the JM1 performance.

Figure 4. 7. *JM1 QIs history*



Note. Summarized by the author.

The genba Kaizen groups established based on section such as quality control (QC) and production. The committee conducted mentoring in rotation. For example, initially, group 1 would be mentored by two managers from production and QA. The following month, there would be another committee group that mentoring the group. JM1 does not mix the group because it is difficult to arrange the time between different departments due to the employees' tight schedule.

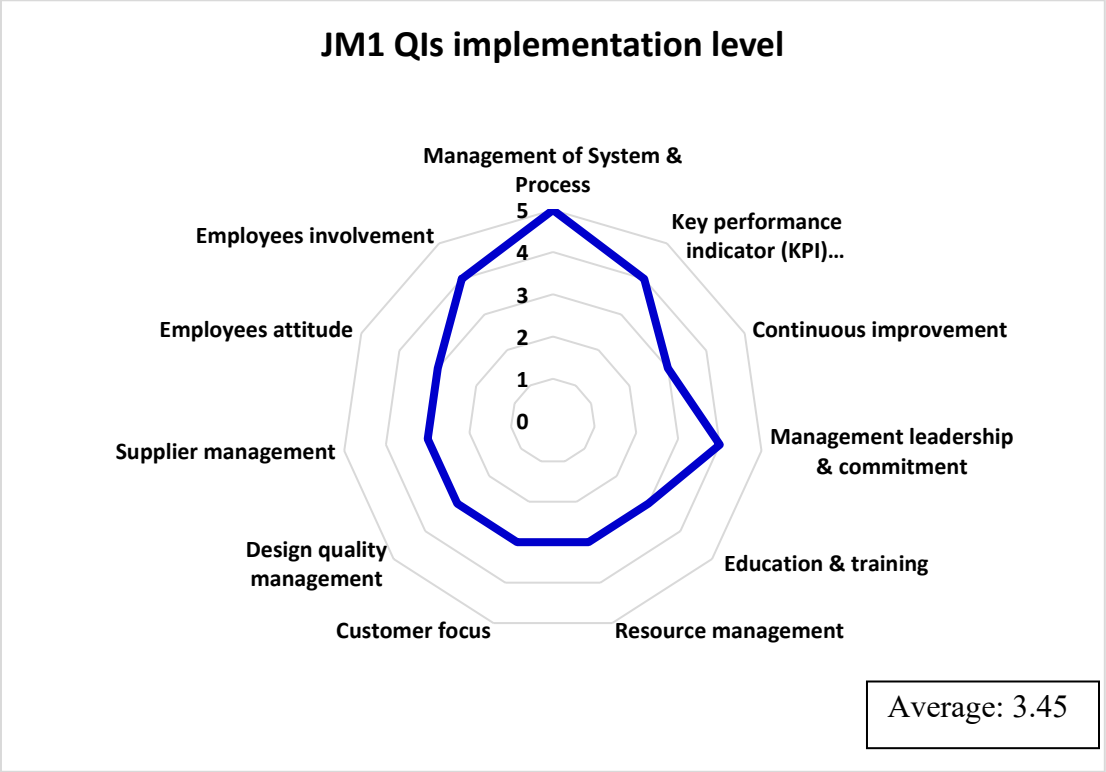
Similar to JL2, JM1 ISO-9001 certification motivation was customer-driven since JM1 experienced a number of customer complaints before being certified as ISO-9001 manufacturing company. Moreover, the reason to seek for the ISO 9001 certification was also because the customers' request to represent quality improvement activities.

In general, JM1 QIs implementation is at moderate level with an average of 3.45 points, as depicted in Figure 4.8. JM1 has good management system and process, key performance indicator, management leadership and commitment, and employee involvement. High implementation level in management system and process was due to frequent activities and good monitoring for genba Kaizen and QIA. These activities ensure participation from various employees and promote company-wide employees involvement.

Furthermore, JM1 management fully utilized the ISO 9001 system to set-up and meet the KPI objectives and subsequently a management review is conducted frequently (e.g., monthly) to evaluate all department and individual performance at the end of the fiscal year. JM1 management demonstrate their full commitment by joining the meetings frequently. For example, JM1's advisor, general manager (GM), managers, executives, engineers, and supervisors participate in the monthly meetings, and also cross-functional departments such as

QA, QC, Production, Engineering, Maintenance, and Logistic. KPI of JM1 also focuses on environment, safety, and health, which targets zero accident.

Figure 4. 8. *JM1 QIs implementation level*



Note. Summarized by the author.

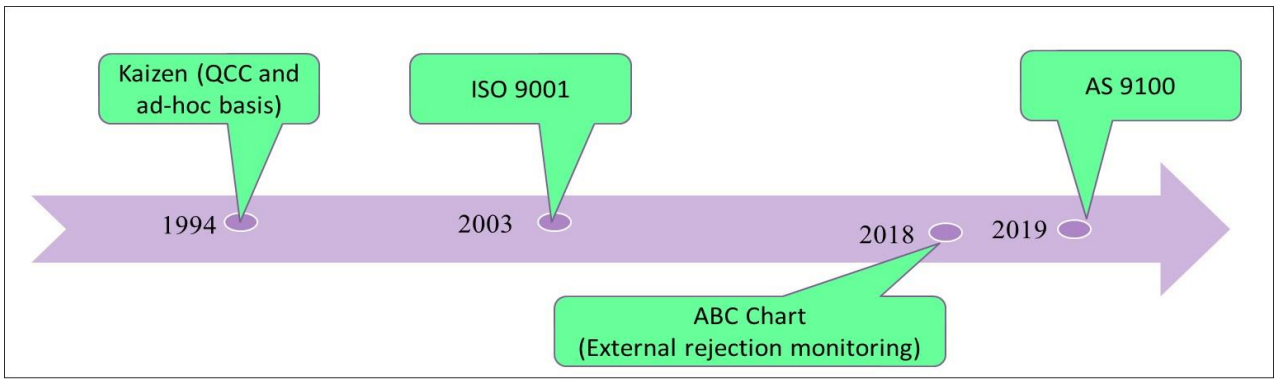
Moreover, there are two types of customers' voices: customers' complaint and customers' feedback. For customers' complaint, the maximum target is only one serious complaint per year, while for customers' feedback, JMI targets only one feedback per month. From JM1's perspective, the customers' complaint means that customers are unable to utilize the product for further assembly process at customers' premises prior to delivery to end user. Meanwhile, the customers' feedback means that customers experienced average level of product quality but they are still assembling the received product and supplying the assembled products to their customers. Since the customers' voice is frequently considered for quality improvement, the root cause of quality-related issues is studied and relevant improvement actions are conducted. For example, copper wire appearance issue was one of the main concerns of production department. The issue rate has gradually decreased throughout the year with the rejection rate of only 2.978%.

However, since JMI is not a large company, the management did not make investment in building specific database or system and no intention in purchasing new high-tech equipment to support the business process. Besides, the products are very simple and can be produced based on drawings and customer specification. In terms of education and training, JM1 seldom utilize complicated tools such as experimental design because the employees do not have skills. Improvements conducted were based on employee experience through trial and error method.

4.1.5 JM2 QIs History and Implementation Status

Figure 4.9 shows JM2 QIs history. JM2 doesn't have any specific organization chart for Kaizen. JM2 will conduct Kaizen when requested. However, employees aware that when management mention Kaizen means there's something they need to improve. Besides Kaizen, JM2 implemented quick response quality control (QRQC). QRQC previous name was QCC but the approach is similar. There's no organization chart for QRQC. It is similar like Kaizen. JM2 will conduct the QRQC if requested. QRQC is related to quality. Since it is related to quality, automatically it will falls under QA responsibility and production will implement accordingly. JM2 do establish some groups. This program may be short term or long term depending on the problem to be tackled.

Figure 4. 9. *JM2 QIs history*



Note. Summarized by the author.

JM2 mentioned that ISO 9001 and ISO 14001 implementation are quite stable because both standards have been implemented for quite a long time. Initially, JM2 hire a consultant to in charge for everything even for the internal audit since 2003 to 2006 for certification purposes. The procedures were nicely prepared by the consultant. Thus, there is a possibility that the employees are not aware about it. Last year, JM2 transited to the new version. JM2 handle the

whole internal audit independently without the consultant for the first time. The consultant just observe the status.

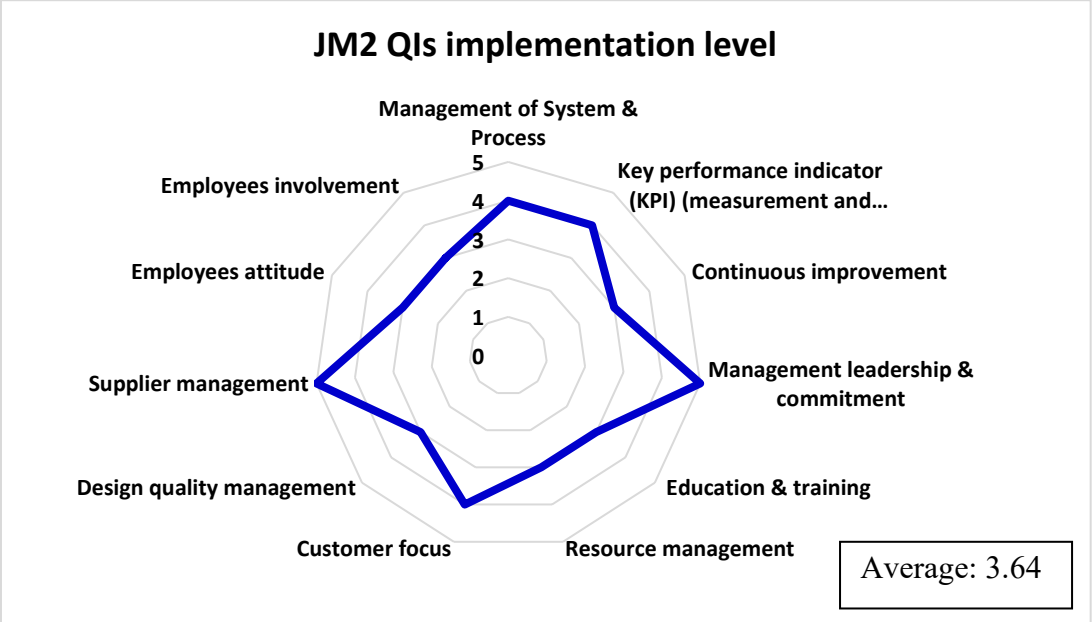
Since there is a possibility for employees having a poor awareness of related procedures, JM2 ensured that the newcomers understand these procedures via some awareness session/program. JM2 even briefs them about the things that they are required to do for each department. Since JM2 is certified with the aerospace standard (AS), the AS auditors are firm because JM2 is dealing with aerospace tight requirements. The auditors asked questions not directly to the Quality Management Representative (QMR). That is why JM2 tried to emphasize these things. In order to resolve these concerns, JM2 requested and conducted internal audit training session for certain staff, which involves a lower level as well. JM2 requires employees to fully understand what internal audit is. At least their employees knew the contents of the internal audit and the ISO clauses. Some employees become aware of related procedures, which indicated that their level of awareness has increased, resulting from the awareness training. Before this, the management implemented "spoon-feed" learning method and provided everything to the employees. However, after a new QA assistant manager joined JM2, she felt that the employees needed to learn and build their own initiative with the mindset that whoever is willing to learn more, will gain more. Therefore, currently she still gives support but minimizes the "spoon-feed" method. JM2 wanted their employees to be independent and able to handle tasks by themselves.

As for ABC chart to monitor external rejection, the top management play an active role in the implementation. MD has hired a consultant who is an ex-Toyota MD and has connection with him. During the first three months, the consultant focused in changing the top management mindset because he believed that a company cannot make changes if there are no changes from the top management. JM2 MD found that the ABC chart had a good effect and wanted to implement the practices in Thailand site as well. It could be concluded that JM2 had aggressively implemented quality initiatives due to the strong support from the top management and HQ.

Figure 4.10 displays the JM2 QIs' implementation level with an average of 3.64 points. It was found that JM2 had high level of management leadership and commitment as well as and supplier management. The management is very supportive and takes the lead in quality improvement activities. The management even joins various meetings, patrols and observes the situation. As for supplier management, JM2 encourages suppliers to implement quality

improvement. JM2 even implements collaborative supplier relation by getting actively involved in developing the suppliers and help them to resolve their problems.

Figure 4. 10. *JM2 QIs implementation level*



Note. Analyzed by the author.

JM2 implements moderate level of QIs practices such as in education and training and resources management. For education and training, HR department may request for ad-hoc training budget from the top management, which is not included in the training plan budget for the year. The budget requisition should be paired with reasonable justification in order to seek management approval. It is easier to get the approval if the training cost can be claimed via HRDF or the training is needed in order to meet the standard requirements such as internal audit training for ISO 9001.

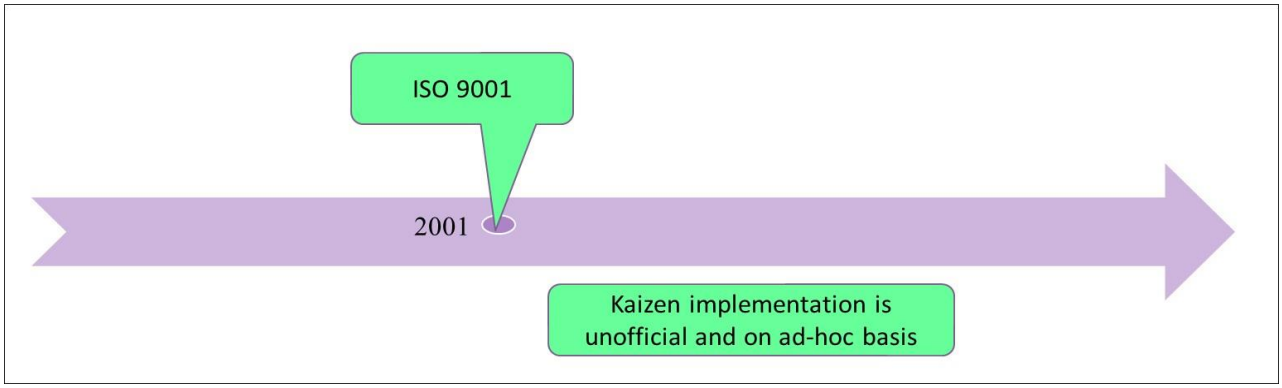
There are not many resources required for ISO 9001 because it has become a general standard implementation. However, it is different in producing aerospace products. The AS requirements are quite specific, for example materials for heat treatment, but the materials are rarely available in Malaysia. JM2 needs to buy tools or materials from outside and has to deal with foreign companies such as Singapore and USA, whereby the price is quite expensive. As for the machine and equipment, top management of JM2 prefers to purchase the branded high-tech equipment (for example, Keyence and Mitutoyo). As for the database system, JM2 has material requirements planning (MRP) and a barcode system. However, the employees were

not really utilizing the system. The employees were just well verse with a basic software such as Microsoft Excel. As for the supplier management, supplier audit is consistently executed to investigate the latest supplier performance. Typically, the audit focuses on issues or claims highlighted by customers.

4.1.6 JS1 QIs History and Implementation Status

Figure 4.11 shows QIs history of JS1. JS1 started to implement ISO 9001 around 2000. At that time, there was no problem because the documentation were prepared accordingly. If there is any complaint, JS1 makes improvement, such as change manual. JS1 needs to certify with ISO 9001 because it is the minimum customers' requirements for suppliers to get a contract is to certify with ISO 9001. Example of JS1 customers are state government agencies such as SYABAS, SAE Selangor, and Johor. Besides that, for waterwork, JS1 needs to have a certificate from Suruhanjaya Perkhidmatan Air Negara (SPAN) or National Water Services Commission.

Figure 4. 11. *JS1 QIs history*



Note. Summarized by the author.

After getting the certificate, then only JS1 is able to make the registration. SPAN will not make any test or conduct inspection. The certification bodies are standards and Industrial Research Institute of Malaysia (SIRIM), Ikram, and Tanqas. These certification bodies only comply and certified by SPAN. If JS1 wanted to register with SPAN, JS1 should certify with one of these four certification bodies. There are committees in these four certification bodies. They do not accept certification from other bodies, which is the customer's requirement. They do not take any other certification besides SPAN. The certified body would conduct the test. The auditors would come, conduct the audit for 3 days, and certify JS1. It is a similar audit

process like ISO 9001. The auditors would check based on whichever standard JS1 implemented. There are many product standards such as BS EN 1234 and 1274. Different types of valves have different standards. Once the certificates were received, JS1 would register at SPAN. SPAN then would give the certificate based on product. Previously, JS1 dealt with Ikram. However, since the PIC from Ikram established a company named Tanqas and became the Tanqas director, JS1 change to Tanqas because JS1 had engaged with him for quite a long time.

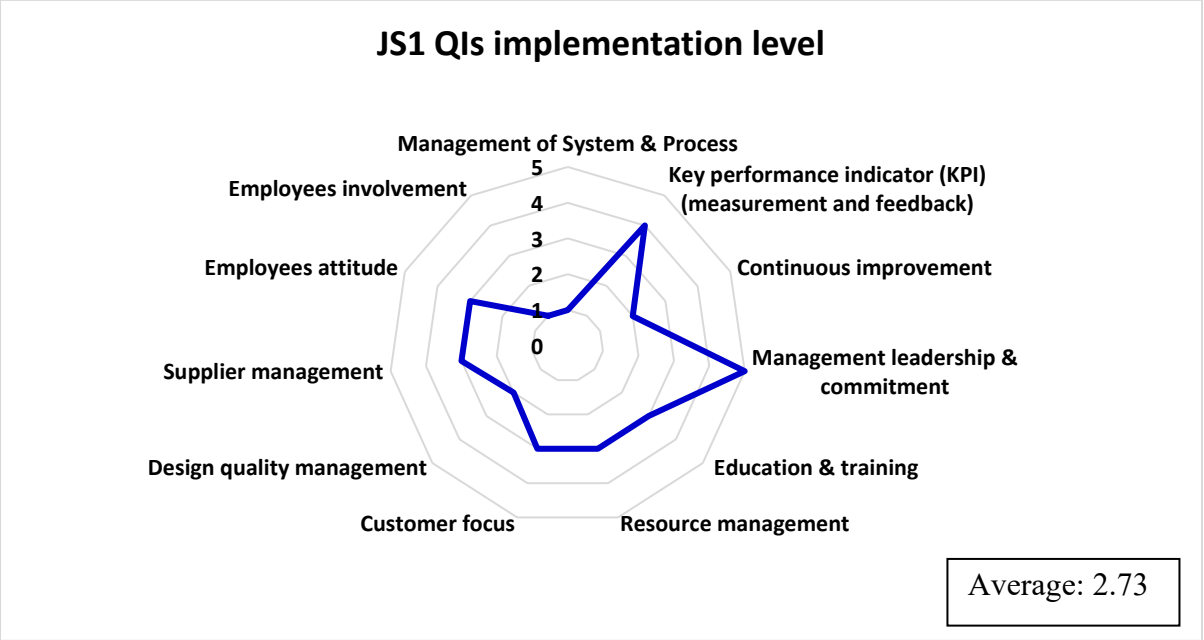
JS1 supplies to Sabah and they requested for ISO 9001 certification as well. The requirements are based on each area or state. If Sabah already has SPAN certificate, the certificate first then needs to be applied only it can be released. It depends on how tedious the requirements of each state is. Meanwhile, JS1 has no specific organization chart to conduct Kaizen. Therefore, Kaizen will only be practiced when urgent issue arises. However, JS1 aggressively implements the 5S and provide rewards to the best 5S group from every department on a monthly basis and consider it as a compulsory daily activity. Meanwhile, the quality improvement programs in JS1 are implemented due to various customers' complaints on the products. Through the programs, JS1 immediately reviews and investigates the complaints to improve any problematic areas.

However, JS1 relatively receives assistance from Japan HQ annually. The assistance is indirectly delivered by auditors from HQ during audit process once a year to comprehensively review, verify, validate, and subsequently propose countermeasures for product improvement. The auditors apply specific HQ standard instead of ISO 9001 standard. Once the audit is completed and product improvement is successfully conducted, top management of JS1 is ready for the official ISO 9001 audit.

Figure 4.12 depicts the JS1 QIs implementation level. It was found that JS1 performance was slightly below moderate level with an average of 2.73 points. JS1 have a strong hold in KPI as well as management leadership and commitment. Moreover, JS1 is very weak, especially in terms of system management and process and employees involvement. For JS1, the KPI objectives are very clearly defined. For example, KPI for part rejection is to control the total cost of part rejection by targeting equal or less than RM700 (approximately ¥18,000) per month. JS1 monitors the target on monthly basis and reports the status during the monthly meeting and management review meeting. There was less internal issues and results were good. As for management leadership and commitment, JS1 management are very

supportive. The management joined related meeting and closely followed up the status. Furthermore, the management has lots of experience and is able to advice on technical aspects.

Figure 4. 12. *JS1 QIs implementation level*



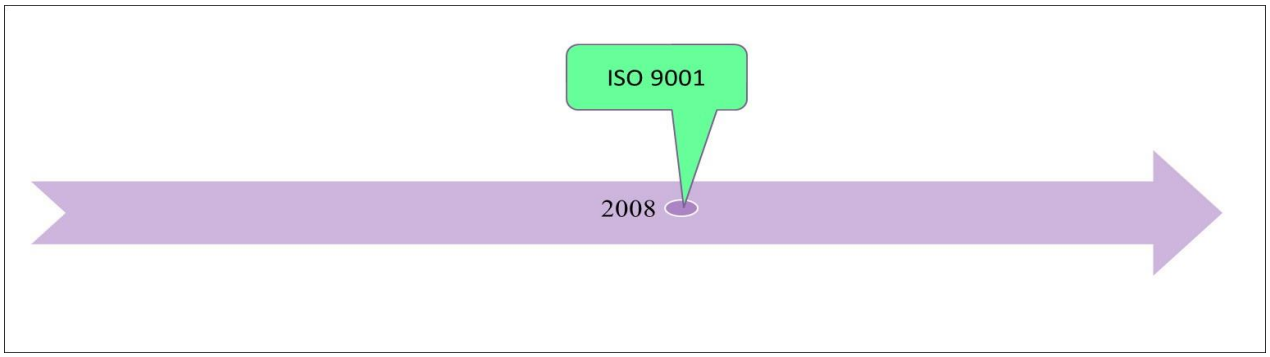
Note. Analyzed by the author.

JS1 demonstrated lack of implementation in management system and process, whereby there was less effort made to implement Kaizen officially. Furthermore, improvement activities were conducted on ad-hoc basis. After the PIC that oversees the improvement activities resigned, and nobody is assigned to take over the task in monitoring the improvement status. Therefore, the activities become inactive. As for the employee involvement, JS1 received many feedbacks from supervisor level but seldom from operators. Besides, there was less cross functional discussion and no appropriate channel to share opinions and ideas.

4.1.7 ML1 QIs History and Implementation Status

Figure 4.13 displays ML1 QIs history. ML1 hired a consultant during the ISO 9001 start up and developed the key structure and process mapping together with the consultant. However, documentation and other details such as standard of operating procedure (SOP), accreditation, education, management review, etc., ML1 implemented it independently, which was similar for ISO:9001 2015 version. It was 100% implemented by ML1 since the employees gained the experience from the initial certification audit.

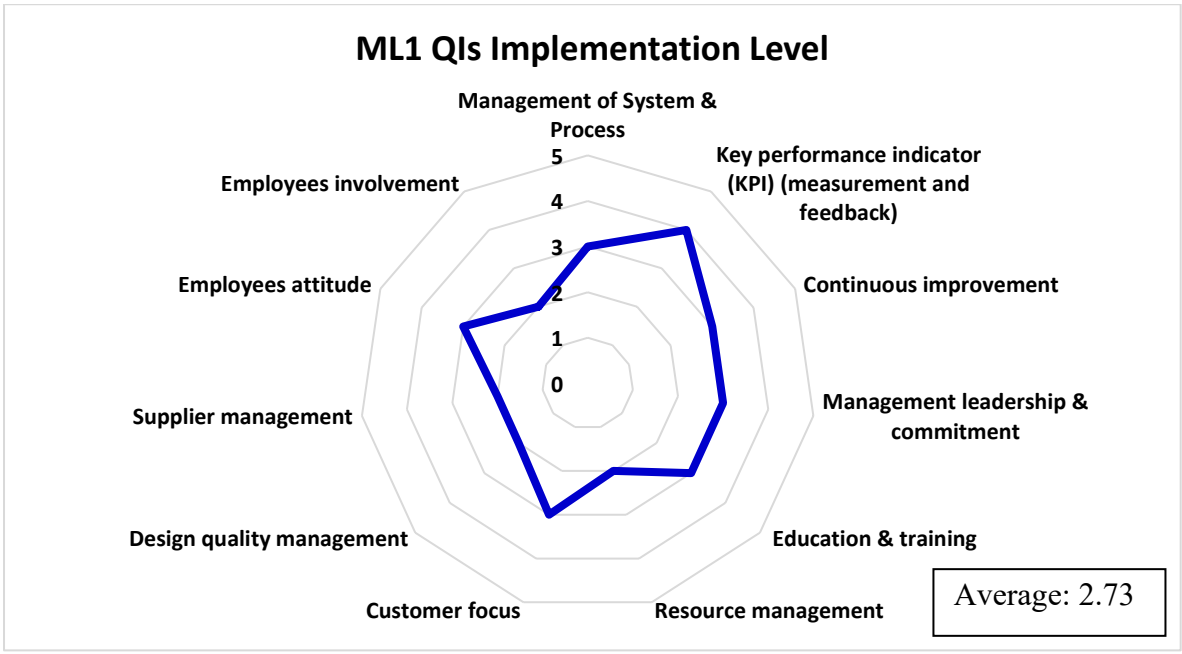
Figure 4. 13. *ML1 QIs history*



Note. Summarized by the author.

Figure 4.14 shows slightly below moderate level of ML1 QIs implementation with an average of 2.73 points. Only KPI implementation achieved an above moderate level because ML1 monitors the performance based on two aspects, namely effectiveness and efficiency. For example, rejection rate explains ML1's effectiveness while output represents the efficiency. As for QA, a customer complaint is considered effectiveness while duration to approve the material or WIP is considered efficiency. However, there are a few notes that the management should be careful of. For example, the ML1 management did not demonstrate their commitment through actions, conduct frequent meetings and gave rewards to employees as they considered it nonsense.

Figure 4. 14. *ML1 QIs implementation level*



Note. Analyzed by the author.

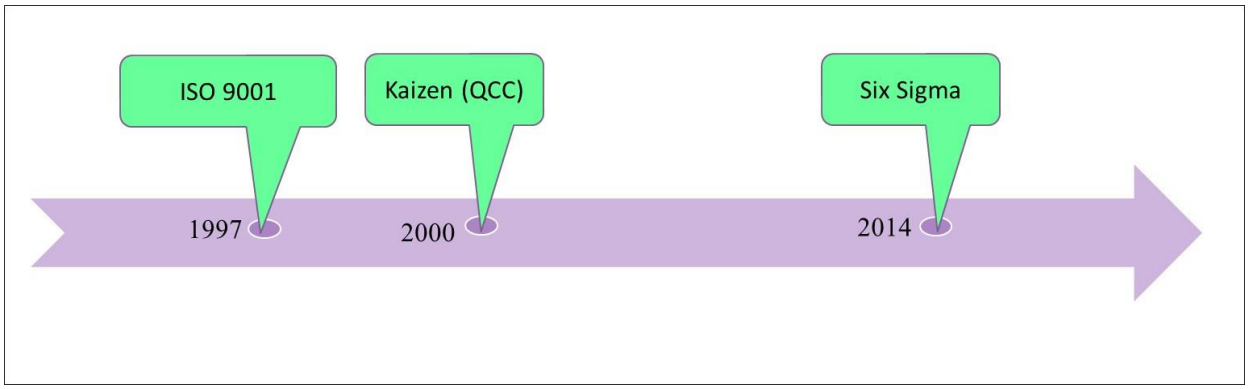
Among factors that contributed to the below moderate level of implementation were those due to less stringent requirements imposed by customers. The retail requirements are not difficult as long as ML1 meet the packaging criteria. As for the manufacturing customers, ML1 need to understand the customers' application, usage, and expected performance. The tape industry had been around for about 150 years and the market share has become saturated. As a result, making a new tape is rather impossible. It is better and possible to produce a comparable tape that can compete in terms of cost. The level of guidance to suppliers varies between companies. ML1 clearly mentioned that they did not educate the suppliers, while MS1 guided the supplier's personnel until they were competent for certain processes.

The employee's participation was around 80%. The foreign employees were also involved, but at the very low level. Besides, 95% of ML1 products were for commodity. Therefore, ML1 made it simple and selected a few improvement methods, such as value stream mapping from Lean management concept, FMEA, etc.

4.1.8 ML2 QIs History and Implementation Status

Figure 4.15 shows QIs implementation history of ML2. ML2 started to implement SGA or QCC in 2000. Malaysia Productivity Corporation (MPC) was the one that encouraged ML2 to implement QCC. Consequently, ML2 has a QCC team and each sector is required to submit the QCC team. First, by zone and afterward competition between the states. When ML2 joined this competition, all the industries gathered. During the competition, they would observe ML2 presentation and learn how ML2 conducted the improvement. It serves as a marketing strategy to promote ML2. Finally, ML2 achieved champion under manufacturing sector category in 2000. This indicated that ML2 was doing well and QA had a good control. So, from this, other companies would observe and recognized ML2 good quality and practices. However, MPC did not assist ML2 during the QCC implementation. Furthermore, ML2 have internal trainers to guide the employees during the improvement project activities.

Figure 4. 15. *ML2 QIs history*



Note. Summarized by the author.

ML2 implemented Six Sigma program in around 2014 and 2015. ML2 conducted awareness training for related PICs via external trainers. Up to date, there are about 10 employees certified with black belt and 3 employees with green belt. ML2 implemented Six Sigma due to the request from a customer named International *Business* Machines *Corporation (*IBM). Although, IBM business is dropping but ML2 is still doing the business for them. IBM is one of the giant companies. They recognized Six Sigma standard. As a supplier for IBM, ML2 is required to comply to the Six Sigma standard as well. Although, ML2 conducted the Six Sigma projects as requested by IBM in order to get the approval, IBM didn't assist ML2 during its implementation. IBM set out the time frame for the submission of project report by ML2. It was left to ML2 when to get the consultant, receive the training, conduct the project and submit according to their time frame.

ML2 requested an external trainer to conduct an in-house training of Six Sigma project for employees who were assigned the project. To implement Six Sigma, awareness training was conducted which involved all employees. As for the specific program, only certain PICs were included who were involved in the project. They had few trainings in order to complete the project. What is the knowledge they need to have? Based on that, ML2 provided the training to get them understand. Then only they'll kick off the project.

ML2 conducted Six Sigma program due to customers request, enforcing ML2 to execute the program, hence submit the mandatory projects as requested by the customers. However, Six Sigma implementation in ML2 is currently inactive. Besides that, ML2 implement small group activities as well. ML2 form a team called small group activities and they will be given one project to handle based on current issue and target to achieve (for example, to reduce reject rate from 1% to 0.5%). The team tries to improve and provide a

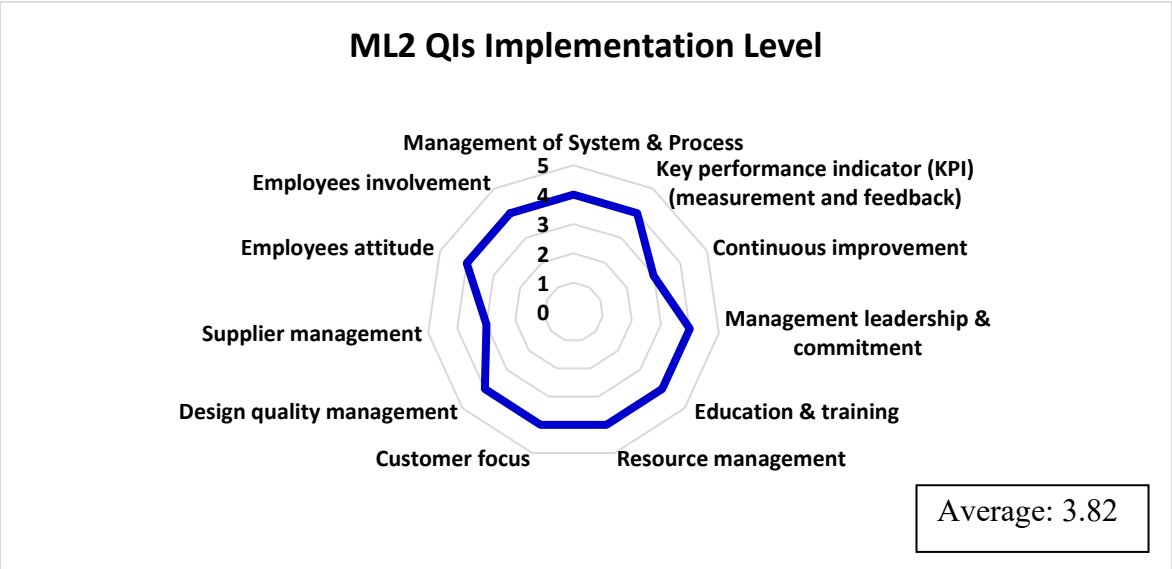
suitable proposal accordingly. ML2 provides them some reward if they achieve the target. Currently, the small group activity is not frequently utilized due to its difficulty and the management invests on it only on customers' demand.

Besides meeting customers' requirements and expectations, aiming to obtain social legitimacy is evident among the case study companies. For example, ML2 emphasized that one way to demonstrate that it is a capable supplier is via recognition and its compliance to related standards such as ISO 9001, IATF, ISO 14001, and OHSAS. It is normal for companies to be certified with ISO. However, it is a different story if the company certified with IATF, etc. IATF signifies that the company standards are high since they are able to produce some automotive products. Besides, ML2 is certified with Underwriter Laboratories (UL) standard as well. UL representative audits ML2 and ensures that ML products are meeting the UL standard requirements. List of big customers (for example, IBM, Proton, Perodua, General Motors and Ford) are also important to showcase that ML2 is capable to produce some high-end products.

Companies that implement the QIs are able to increase new potential business area. For example, ML2 certified with IATF due to the needs in penetrating the automotive business. Once certified, it can be observed that ML2 is steadily getting the business from Malaysia's two main car manufacturers, Proton and Perodua. For example, ML2 management leads the SGA implementation by focusing on the improvements at the critical rejects. Besides that, ML2 gained two benefits after joining this competition. It's like a double dagger; improving processes and to promote ML2 as well. When they were able to be a champion, it signifies that ML2 is a well-managed company.

Figure 4.16 shows the ML2 QIs implementation level with an average of 3.82 points. It was found that most of ML2 implementations were above the moderate level, especially for management of system and process, management leadership and commitment, employees attitude and involvement. The ML2 management went to the extra length in providing rewards for employees, such as the monthly best employee's program, employee's suggestion scheme (ESS), and the appreciation rewards for the QCC However, the award price was not fixed.

Figure 4. 16. *ML2 QIs implementation level*



Note. Analyzed by the author.

In the case of injection molding manufacturers, most of the product's designs were from the customers. During the process design, ML2 made a mold, trial run the product and submitted the first article report (FIA), which included the APQP, PPAP, SPC, etc., to customers. Furthermore, both companies conducted analysis (for example, feasibility study) and determined the resources needed, such as machine and line design. ML2 used well recognized machines, such as the Japanese machines (for example, Mitsubishi) and softwares to monitor and understand the process capability (for example, SPC, process capability index (Cpk) to demonstrate ML2 capabilities to customers, as well as increase employees' confidence. In addition, ML2 mentioned that customers expected a higher standard from the Six Sigma companies. The customer's approach and the standard needed was different. The customer expected that ML2 to provide a more detailed data such as Cpk, PPAP, APQP record, etc., for the outgoing report.

As for ML2, anybody could contribute their suggestions via the employee's suggestion scheme. However, for the Six Sigma or SGA, the company would nominate related employees for the projects' execution, but this was not compulsory. From ML2 point of view, it was important to show the commitment via actions. ML2 had to think of ways to lessen the operators burden to enable them to focus on product quality more, and provide better environment for them. Examples of improvements were to improve the mold condition to eliminate flashing, implement poka-yoke (for example, provide jig for checking measurement),

and provide additional fans. Externally, those activities illuminated positive impression in the view of related bodies and customers which, would convince customers with the ML2 processes and capabilities.

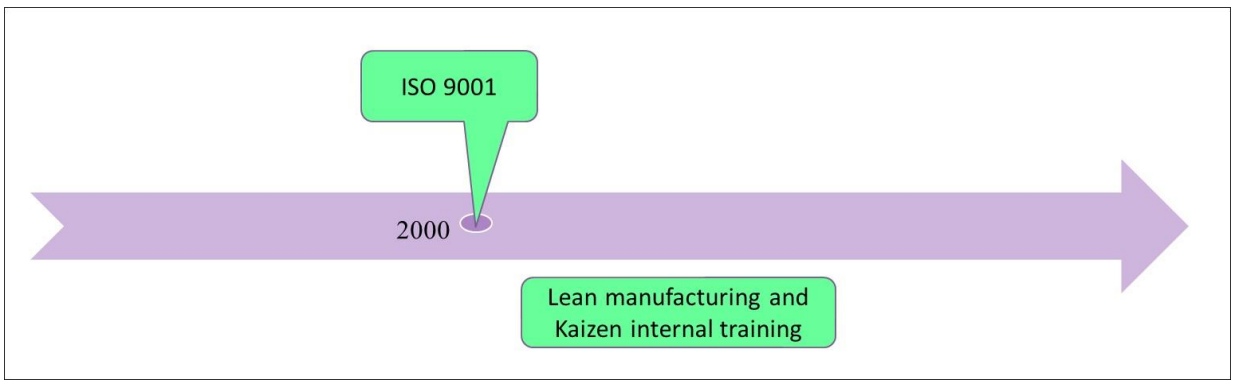
ML2 still have some issues in terms of cooperation and teamwork. Teamwork is an essential component especially between production, QA, and engineering and without it manufacturing companies cannot run smoothly. As a result, ML2 will have problems when operators cannot detect the rejects, QC will have to halt and conduct sorting. This might affect delivery to customers and hence affect ML2 reputation.

4.1.9 MM1 QIs History and Implementation Status

Figure 4.17 shows the QIs history of MM1. MM1 is only certified with ISO 9001. MM1 has never been fully applied the Lean manufacturing concept. It is only for employees to understand the improvements that can be performed from Lean manufacturing, such as to improve the parts and the quality.

MM1 doesn't implement any other QIs besides ISO 9001. However, since MM1's senior manager is well verse with Lean manufacturing, he internally trained the employees the basics of Lean and Kaizen. All the improvement activities were integrated together under ISO 9001 CI activities. As for injection molding, MM1 observed and concluded that it is not effective to implement Lean. MM1 is starting the light-emitting diode (LED) assembly line and intending to implement Lean manufacturing in future. Most of the MM1 customers are from Japanese companies. Therefore, MM1 have to follow the culture and obligate to their requirements and system. For example, since the customer utilize Kanban system, MM1 inclined to do so as well.

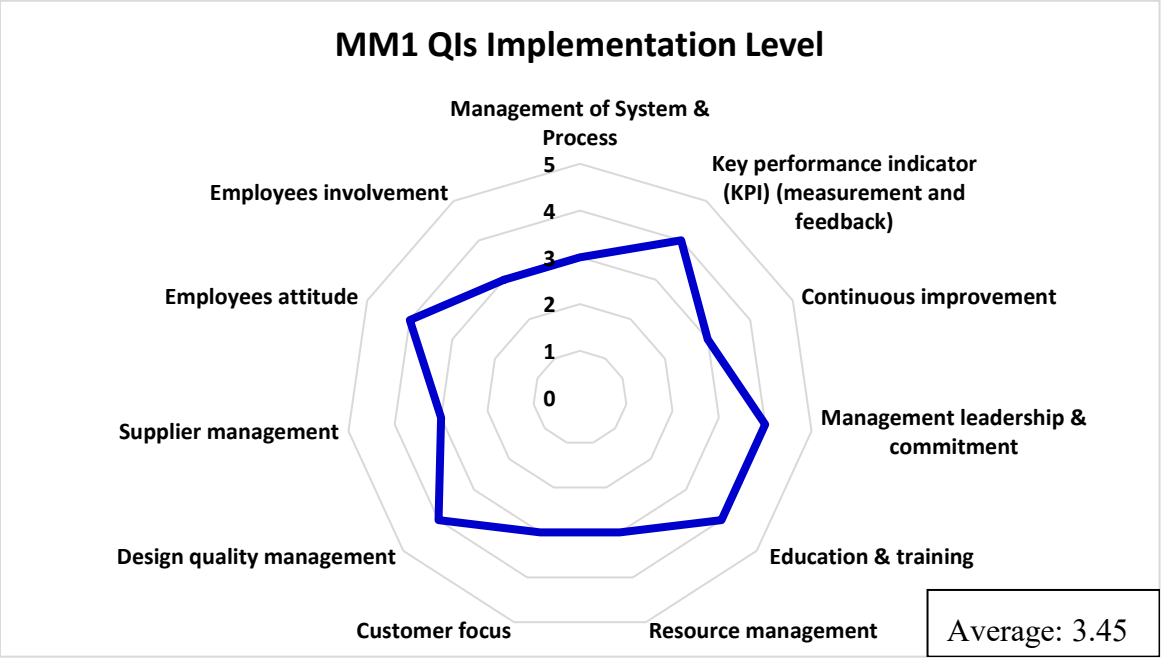
Figure 4. 17. *MM1 QIs history*



Note. Summarized by the author.

Figure 4.18 show MM1 QIs implementation level with an average of 3.45 points. The most distinguishing things about MM1 is related to management experience. The management experience and familiarization with the QIs were among factors which increased the management commitment. MM1 management has diversified background and experience in working with multinational companies. For example, the MM1 director was an ex-director of an electronics company, and the senior manager worked in a company which implemented the Six Sigma, Lean and Kaizen. Thus, MM1 does not have problem with management involvement. The communication is quite smooth since the 2nd level management have lots of experience. Hence, there is not so much resistance from leaders and operators in the case of MM1. Most of MM1 leaders have been working in MM1 for quite a few years. The leaders have positive attitude whereby they readily accept any new improvements or changes.

Figure 4. 18. *MM1 QIs implementation level*



Note. Analyzed by the author.

As for education, MM1 conducted a few activities to ensure new employees are comfortable and able to adapt with MM1's environment. MM1 provided simple tools and utilized the foreigners' language to communicate effectively. Besides, MM1 put extra focus to train new employees who seemed to have trouble understanding. MM1 PICs believed that ISO 9001 can improve the product quality and make companies system more systematic. The ISO 9001 requirements have become a norm for MM1 since MM1 implemented ISO 9001 for quite

a long time. It is a different story for IATF 16949 because it requires a lot of money especially in terms of consultation and certification. Furthermore, MM1 needed to execute lots of preparation because IATF 16949 is much tougher than ISO 9001. Automotive customers do not accept suppliers without IATF certification. They desire some world class suppliers who are certified with IATF since the automotive industry dealt with safety aspect. They require high quality and expect that the car should function well as long as they are using it.

Sometimes, the level of education is questionable because some fresh graduate engineers who hold a bachelor's degree in engineering cannot answer and explain some easy questions during the interview as highlighted by MM1. Most of the degree level engineers are good at theory but not hands-on (practical). MM1 desired an engineer who is competent, able, and willing to learn. Furthermore, some engineers cannot communicate in English well as highlighted by MM1 and MM2. It is essential for engineers to speak English fluently since most manufacturing companies in Malaysia uses English as their first medium language for communication.

Furthermore, it was found that the small and medium size companies might have difficulty to attract talent pool employees. A recruitment candidate who knows the ISO and is knowledgeable usually demands a high salary rate. Nowadays, even the fresh graduates are expecting the initial monthly salary of around RM3,000. Therefore, to resolve the issue, MM1 would employ individuals who know basic ISO, train and improve their skills, position and gradually increase their salary. Additionally, the workforce common norm in Malaysia is they easily jump from one company to another before they settle down. This is an advantage to the manufacturing companies in terms of obtaining a workforce with various experience and diversified background.

The quality improvement activities were disseminated via management meetings and training. MM1 had management meeting every Monday involving the management, engineers and executive levels. Furthermore, MM1 conducted internal department meeting every morning as well to communicate internal and external issues. If there was any customer's feedback, then MM1 would immediately call for a meeting to discuss the 5M root causes, actions and countermeasures.

For LED products, MM1 captured the customers expected requirements based on the customers' feedback and complaints. Since, the MM1 is a manufacturer for the LED, it attended to customers' feedback and was able to design based on the customers' requests. MM1

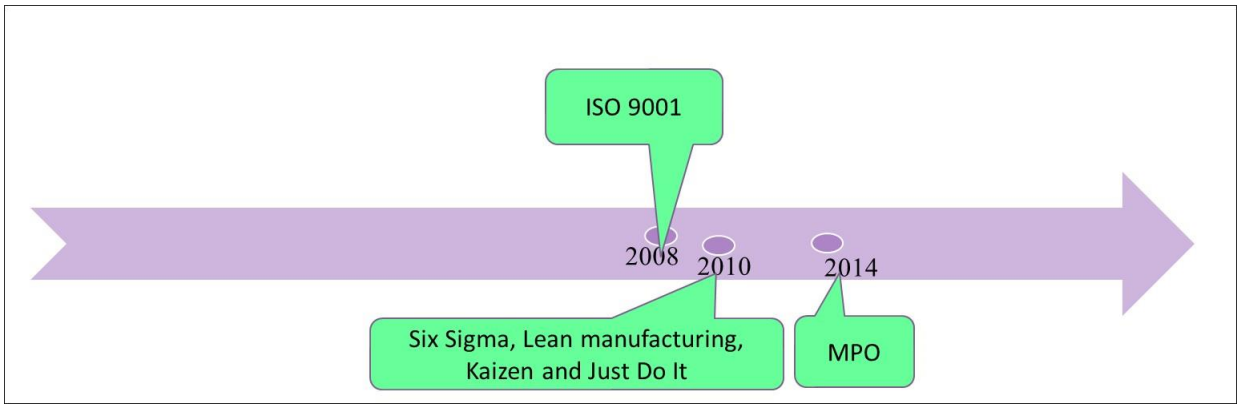
joined various exhibitions (for example, organized by the SIRIM and Fraunhofer) on LED products to capture feedback from customers and record it accordingly.

MM1 observed that the employees' thinking level and culture had improved. Previously, they blindly followed the standard operating procedures (SOPs) and work instructions. Once MM1 conducted the Kaizen and Lean basic training, the problems were identified. The engineering and quality department established the SOPs and work instructions. However, the operators were the ones doing the jobs. Maybe the established process flow was not suitable for the operators. The operators would find a better way and propose to their leader. The leader would verify whether the improvement is good, or not and forward the suggestion to engineer, if necessary. Thus, MM1 employees could channel the ideas to the management through their superiors. The improvement program was integrated with the ISO system. Therefore, the responsibility for all employees was on a daily basis.

4.1.10 MM2 QIs History and Implementation Status

Figure 4.19 shows MM2 QIs history. MM2 is certified with American Petroleum Institute (API) Q1. MM2 also has a testing lab and certified with ISO IEC 17025. National unified laboratory accreditation scheme, known as Skim Akreditasi Makmal Malaysia (SAMM) certified MM2 products, hence MM2 received SAMM number. In fact,, MM2 conducted lots of improvement. Previously, MM2 implemented Six Sigma program from 2010 till 2014 but currently MM2 is not actively implementing it since MM2 products are few and most of the products are stable. It is more applicable to electronics. MM2 adopted Lean processes more, instead. Previously, MM2 had a full time PIC. MM2 implemented Lean processes but adopted Six Sigma DMAIC improvement process without monitoring the Six Sigma defect. MM2 divided the projects into five categories based on the size of the project. The five categories are black belt project, green belt, "just do it", Kaizen, and Lean. MM2 conducted a few black belt projects and also some green belt projects. As for "just do it", it is for small improvement projects that can be done immediately. MM2 do conducted a few Kaizen and Lean projects as well.

Figure 4. 19. *MM2 QIs history and implementation status*



Note. Summarized by the author.

Six Sigma program involved cost calculation. So, MM2 calculated the estimated cost saving if conducted on black belt, green belt and "just do it" projects. But for Lean and Kaizen, MM2 didn't calculate the cost saving. As for the project categorization, the criteria applied was similar as the Cameron criteria, the vice president of quality, health, safety, and environment (VPQHSE) previous working company. MM2 considered RM 200,000 and above worth of improvement saving target as a black belt project. MM2 full time PIC was a very hardworking person. He conducted the study and various tasks. But he resigned because he received a better offer. Consequently, the activity was stopped for a while.

Besides that, management also needed to give their support. VPQHSE was the one that drove the initiative. But since 2014, the top management has focused to a different area related to manufacturing process optimization (MPO) instead. They hired a consultant. But the consultant didn't use a proper analysis such as DMAIC. Production just make some data analysis and then the consultant just proposed some solutions. Currently, MM2 implemented around 30% of the proposed solutions. That's the typical consultants. Many proposed solutions failed to be considered as practical. MPO was conducted from 2014 till 2016. After that, MM2 stopped operation due to oil and gas recession in 2016 and 2017.

Currently, the improvement activities are still ongoing, but it is not so extensive as compared to previous years. Previously, the improvements were documented, monitored and MM2 kept track of cost saving. Nowadays, the improvements are made but it is not properly documented. For example, recently, there is an issue for Exxon. According to API 6D, 6D SS, little leaking for metal seated is permissible while Exxon requested for zero leaking. It is hard for MM2 to comply. As a result, currently MM2 has conducted some study as part of Six Sigma.

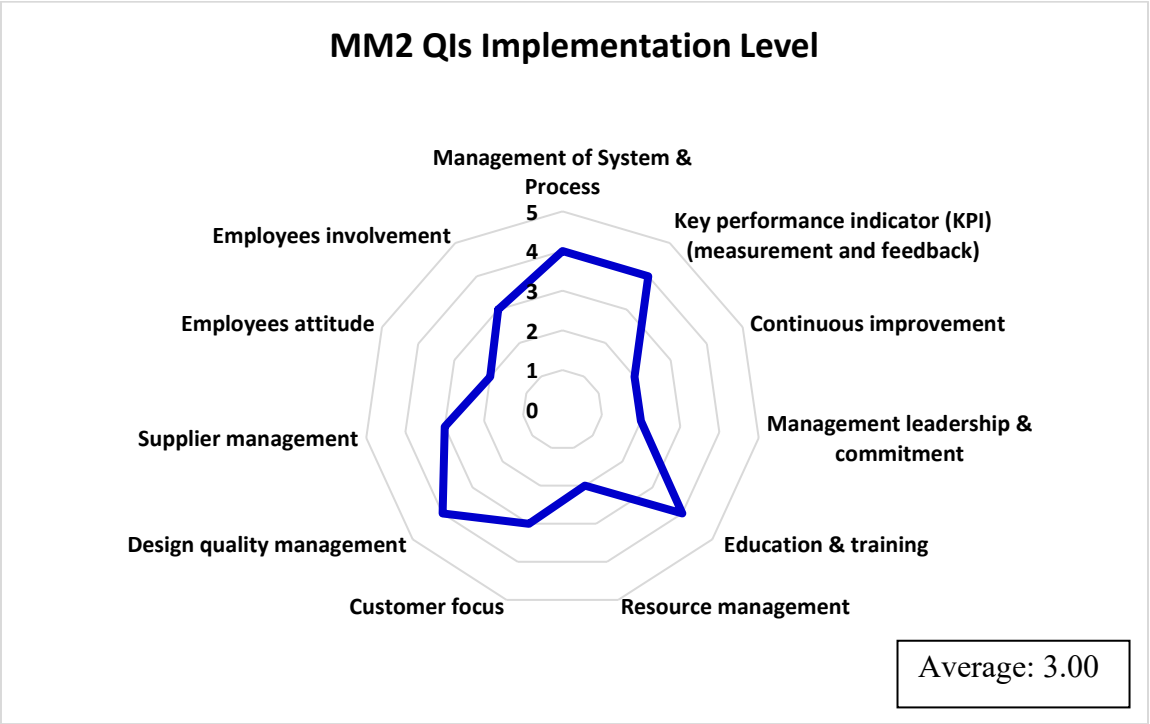
But since MM2 do not actively implement Six Sigma anymore, the documentation is not integrated. Engineering is responsible to conduct the study and they keep the records.

Besides ISO 9001, MM2 is certified with API Q1 and ISO/IEC 17025 as well. MM2 has conducted lots of improvement. Previously, MM2 implemented Six Sigma but currently MM2 is not fully implementing it, since MM2 products are fewer and most of the products are stable. It is more applicable to electronics. MM2 is keen in adopting Lean processes instead integrating the Six Sigma DMAIC process into it. MM2 divided the projects into 5 categories; black belt project, green belt, just do it, Kaizen, and Lean. The vice president of quality and HSE are the ones that drove those initiatives. Previously, MM2 had a full time PIC but he resigned. Therefore, MM2 activities stopped for a while which is one of the problems if a skilled person resigns. Currently, the management focuses in different areas related to MPO. MPO project was conducted by external consultant. The consultant proposed many solutions but whether it is practical or not is a different issue. MM2 most probably implemented around 30% of the proposed solutions only.

Figure 4.20 shows MM2 QIs implementation level with an average of 3.00 points. A few points highlighted by the interviewee might contribute to the below moderate implementation level, such as lack of continuous improvement activities, management support and budget allocation. Previously, MM2 implemented Six Sigma systematically with frequent meeting every month, status monitoring and report presentation once the project is completed. MM2 management will decide during meeting whether they want to tackle the issue(s) or not. If yes, QA will categorize the issue(s), assign PIC and monitor the status. Six Sigma is driven by QA. Thus, sometimes, the PICs gave less cooperation. It is a different story if it is driven by the MM2 CEO like MPO. However, MPO was not properly studied and measured. Besides, lots of systems from the consultant disturbed the MM2 existing systems.

In terms of education, companies might have some difficulties in getting external training due to high training cost. For example, since the training costs are all in USD and very costly, MM2 can’t afford to send the employees for the API training. To understand the changes and requirements, the respective PIC need to understand it themselves. MM2 sent an employee for the training, but the employee eventually resigned. That’s one of the difficulties that MM2 faced. As for facilities, the database system (for example, IFS utilize by MM2) is very slow. Besides, the licenses for users are limited and not sufficient because MM2 has to pay for it.

Figure 4. 20. *MM2 QIs implementation level*



Note. Analyzed by the author.

As for external consultant, MM2 management assigned an external consultant to drive the MPO improvement activities but it was not so effective as well. The companies' employees were very busy with other tasks. Therefore, they wanted simpler processes. But, most of the MPO solutions were to add procedures and forms. Subsequently, no one filled in the forms. At the end, the actual improvements implemented were just around 30%.

In the case of MM2, the management's commitment is there even it might be not 100%. Similar to project management, most people did not understand how to properly manage a project. MM2 is no exception. The VPQHSE stated that he was familiar with project management tasks since he had taken a project management course during his study for MBA. MM2 do not allocate any budget. Sometimes, budgetary constraint from MM2 limits the employees' activities to install new equipment for improvements. Based on the MM2 VPQHSE experience from his previous working company, the budget allocation encouraged and enabled employees to conduct the improvement activities. Besides that, MM2 had some difficulties as they did not have a full time executive. MM2 cannot hire a fresh graduate for process improvement management and monitoring. At least the coordinator must have 3 years of working experience, independent, passionate and able to approach people. To monitor and

ensure that the project to be closed in 6 months, the coordinator need to approach people even with their busy schedule. Therefore, they need to hire talented people. Sense of ownership and responsibility is essential as well. Sometimes, the PICs would not implement the corrective actions proposed by QA. That's why the PICs were encouraged to give feedback and suggestions.

Moreover, the management should keep positive momentum in supporting the QIs. For the case of MM2, the top management demonstrated their full commitment towards the improvement program to improve quality during the initial stage. However, during the second phase, the commitment was more towards the MPO which focused on the delivery and profit making. From the VPQHSE observation, there was evidenced that the PICs of the Six Sigma project thought that the project was wasting their time. The employees' attitudes might be negatively influenced by the management attitudes.

Besides, since MM2 conducted various trainings, MM2 had defined clearly the types of training to be evaluated. For example, the evaluation of training effectiveness must be conducted if the training consumed eight hours and above. Additionally, MM2 emphasized that a company should at least have a full-time coordinator to coordinate and monitor the QIs implementation status. If the coordinator is doing other jobs as well, it will be difficult as the coordinator unable to focus. Previously, MM2 asked the QA to concurrently coordinate and monitor the progress, but it was unsuccessful.

As for the software, MM2 and MS2 mentioned that Minitab was quite useful and contained various analysis tools. However, MM2 did not have the software and was not at that level yet. The survey results were analyzed, and related improvement were conducted to improve quality, hence, satisfy customers. As for the valve manufacturers, the general process was that the customer would give MM2 a data sheet including the specifications. MS1 engineers would analyze and prepare the calculations (for example, size and product capabilities), calibrate to provide a drawing to the customer, and propose a suitable product with desired condition.

MM2 had a full-time legal executive to monitor the requirements compliance. The legal executive read the contract and gauged the legal degree of the requirements. Almost all projects have legal requirements including country related legal matters, but whether it is extensive or not. An example is on late delivery (LD). If MM2 delivers the product after the stipulated delivery date and time, the customer will charge 10% for LD. MM2 received numerous LD, around 10%-20% of the projects, hence, resulting in the profit margin reduction. Sometimes,

the sales team just want the jobs even though they were aware that the MM2 were unable to meet the delivery time to snatch the projects from competitors.

For example, MM2 had several Italian suppliers who were running the family business. They were not certified with the ISO. In Malaysia there are more companies that were certified with the ISO 9001 as compared to Italian suppliers. The suppliers had some existing business and their customers never requested for the ISO certification. However, MM2 requested the suppliers for ISO certification, which were unavailable and the suppliers also had no intention to be certified in the near future. Since they were competent, their products were still purchased. However, during the audit, the big customers such as Exxon or Petronas would ask whether these companies were ISO certified, which was a difficult question to answer. From the customers' point of view, MM2 should not purchase the products from the suppliers, even though the suppliers did not have any quality problems.

MM2 standardized and trained people to follow procedures and the system became more structured. Therefore, the quality issues reduced, and the work environment became better. Besides the above-mentioned culture, MM2 observed that there was increased awareness towards the market request and risk analysis, and the contingency plan. However, MM2 did not provide any rewards. Previously, MM2 had planned for a suggestion system, but it was not continued. The proposal was approved, but then MM2 received less participation. This might be due to MM2 QA were not actively propagating and did not encourage them.

MM2 disseminated quality improvement activities via management meetings and training. MM2 even conducted regular assemblies (three to four times) to brief all employees on the company's status. The related department was given the opportunity to launch something (if any) and communicate accordingly. As for externally, the information would be disseminated during the external audit.

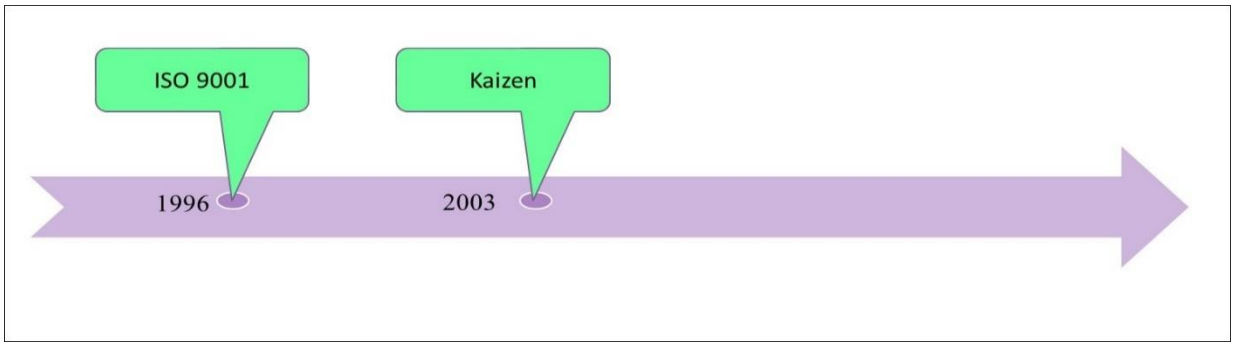
Cooperation and teamwork were considered satisfactory for MM2. As for Six Sigma quality improvement approach, it was under QA department. Therefore, QA had to drive it. But the teamwork was much better if the top management support was visible. Basically, there was no resistant from employees but sometimes they had some time constraint.

4..1.11 MM3 QIs History and Implementation Status

Figure 4.21 shows MM3 QIs history. MM3 implemented Kaizen since 2003. There was a PIC for Kaizen. There were 102 cases for Kaizen improvement conducted between 2003 and 2019. It was not a requirement for MM3 to conduct Kaizen every month. If MM3 were facing

some problems, then MM3 would conduct Kaizen small group activity similar to QCC, accordingly. MM3 tried to conduct the improvement as soon as possible. There was no set period (i.e. January till June) to conduct the improvement. As for the group, MM3 identified the related PICs. The arrangement was normally handled by QA. MM3 purpose to implement the QIs was to solve the problem and consider as potential risk and opportunity for improvement. The QA manager conducted some study on how to make improvements. He came across with the Kaizen improvement activities. Therefore, he requested a consultant to come and conduct Kaizen training. MM3 implemented the Kaizen improvement via QCC activity, afterward.

Figure 4. 21. *MM3 QIs history and implementation status*

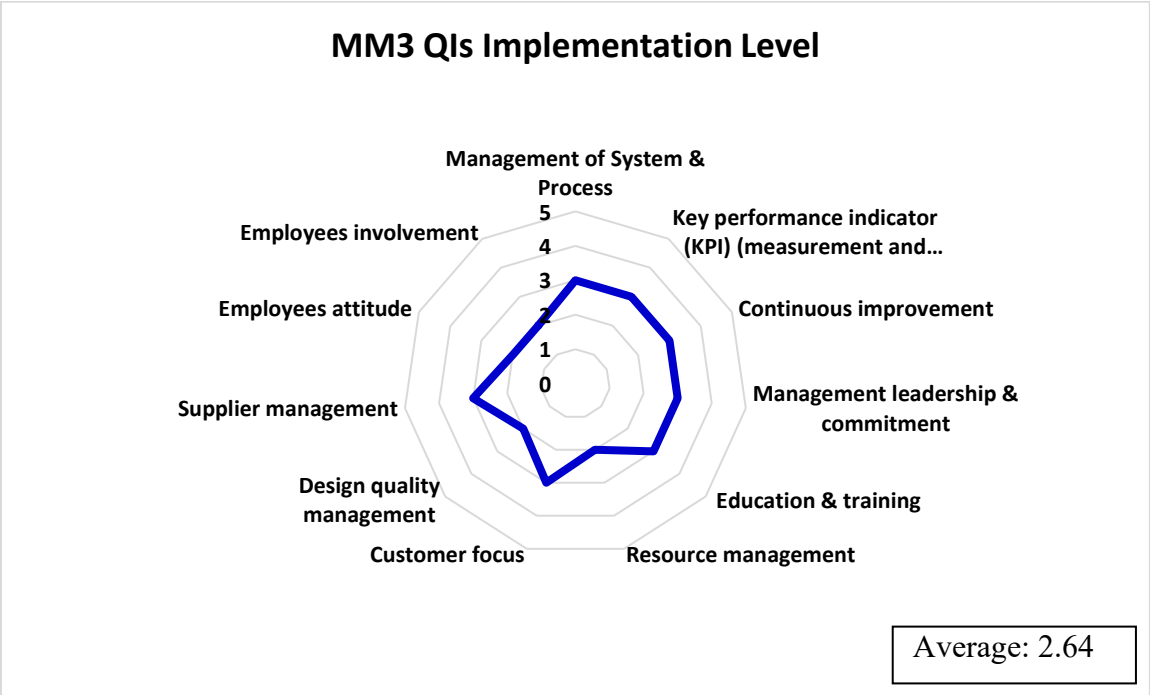


Note. Summarized by the author.

Figure 4.22 depicted the MM3 QIs implementation level with the average of 2.64 points. As for MM3, there was no frequent morning meeting or weekly meeting. The management trusted related PICs to be independent and conducted the improvement activities accordingly. QA had higher authority and would decide if the related improvements will be considered as Kaizen activities. There was a suggestion scheme as well. But MM3 doesn't offer any reward. If the employees gave good suggestion, it would reflect into the employee's evaluation. As a result, there might be a possibility for a salary increment.

As for the training, MM3 had to utilize the HRDF fund. Management and workers gave their full support. However, the QA manager did not think training as a good source for experience as sometimes the trainee did not understand and receive the knowledge needed. Rather, practical on-site training which followed work instructions and SOPs was considered important.

Figure 4. 22. *MM3 QIs implementation level*



Note. Analyzed by the author.

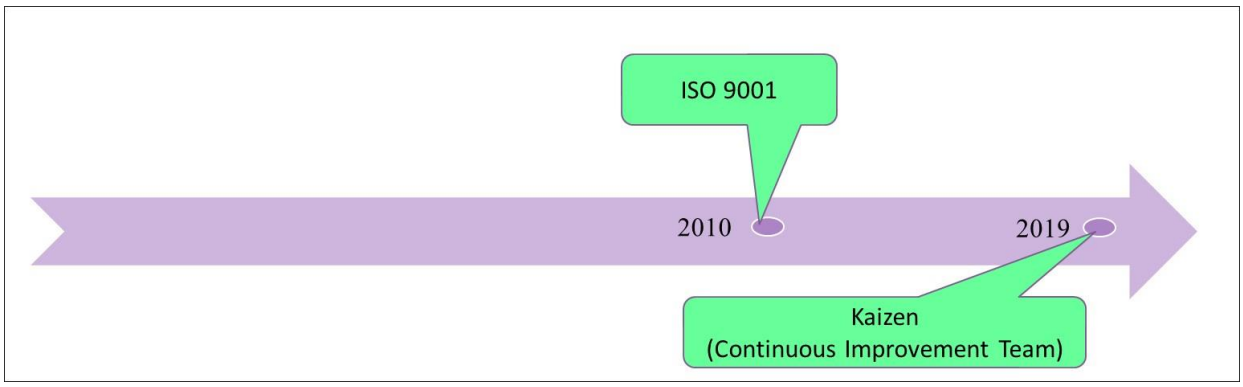
MM3 gained process standardization, reduced human error and was able to expand the business internationally. MM3 customer complaint received around 50 to 100 cases during 2001. However, the cases have reduced to less than 12 cases. One of the factors was due to stoppage of enamel wire production. To produce enamel wire is more difficult. Besides, the sales volume has reduced almost half as well due to technology change (for example, television change to liquid-crystal display (LCD) flat screen). Besides, there are lots of competitors from Japan, German, Taiwan and China. China is able to produce the wire with lower grade material and manpower cost. Besides, the machines they use are new and can operate at high speed. The customers always requested for high quality products, but with lower costs. It was very difficult and MM3 should consider other alternatives, such as the use of lower grade materials. Nowadays, the price is more important as compared to quality. All the MM3 suppliers were ISO 9001 certified since they were from big international companies and dealing with copper wire, which is very expensive.

In terms of culture, MM3 did not provide any rewards. Previously, each department would disagree with each other, but things got better due to the improvements. The employees gave their full support without any resistance.

4.1.12 MM4 QIs History and Implementation Status

Figure 4.23 shows the QIs history of MM4. MM4 implemented the ISO 9001 in 2010. During the implementation of the ISO 9001, MM4 engaged with one consultant. The consultant advised MM4 on how to plan and establish related SOPs. Only then MM4 were able to start implementing the ISO 9001 standard. MM4 took around 6 month-time for the preparation before applying the basic requirements, QMS.

Figure 4. 23. *MM4 QIs history*



Note. Summarized by the author.

Besides meeting customer requirement and expectation, the aim to obtain social legitimacy was evident in MM4. For example, MM4 describe that Japanese companies like to see all ISO related SOPs. Without SOPs, Japanese companies will not be confident. Once MM4 was entitled for both the certifications, customers became very confident with MM4.

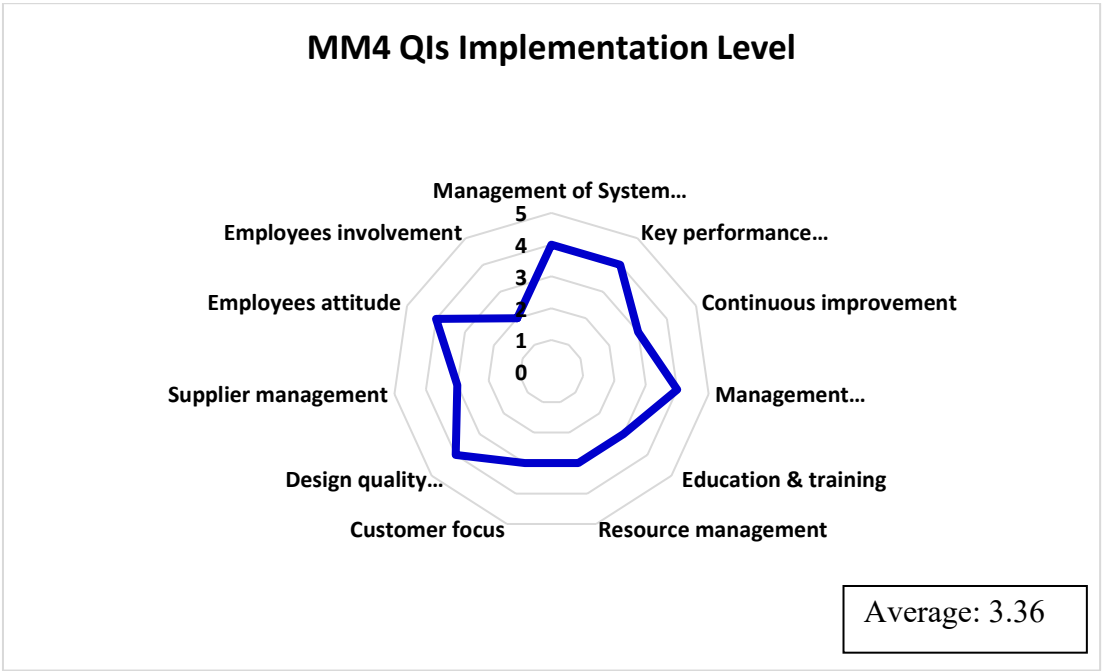
SGA activities conducted by ML2 and MM4 are top down flow under the management instructions. During the management meeting, management will review the current issues, select the critical wastes for further improvements and form some small group activities (ML2) or CI team for MM4. ML2 project duration will be around 3 to 6 months while MM4 will review the status on a monthly basis.

Initially, ZF TRW who supplied product to Proton and Honda assigned one person to train MM4 for almost two to three months. Once MM4 was ready, ZF TRW conducted an audit based on their automotive requirements. Automotive need lots of paperwork and have many requirements. Customers have their own system such as ZF TRW Vendor Information Network (VIN) system and Panasonic Global Procurement System. MM4 able to land more jobs since customers gain confidence with their performance.

Figure 4.24 depicts the MM4 QIs implementation level with an average of 3.36 points. MM4 showed an above moderate implementation level for a few elements such as management of system and process, KPI, and management leadership and commitment. It was evident because the management demonstrated an active role in the improvement activities and took initiative to introduce the CI Team to drive quality improvement activities for certain high rejection products. To ensure smooth communication, MM4 conducted a daily morning assembly at each individual department and provided a logbook to communicate information.

Recently, MM4 Executive Director (ED) who had a Degree in Information Technology (IT) created a paperless system. Once the operators conducted the inspection, they immediately able to input the data via a tablet. All the data could be saved in a MM4 google drive and shared with related employees. There were several benefits for MM4 to gain from the paperless system, such as saving in monthly purchase for stationary, green environment and the ease to monitor the raw materials' status. Furthermore, MM4 is still trying to implement the barcode system. If there is a new addendum (standard body) or MS1, the interpretation might be different from the auditor (for example, calibration and color), then the MS1 need to invest because it affects the third party. As for the machine, the highest technology equipment that MM4 have is the *coordinate measuring machine* (CMM). Next, a contressor is used to measure angle such as chamfer, small groove, and sharpness. MM4 also have a micro-high profile projector.

Figure 4. 24. *MM4 QIs implementation level*



Note. Analyzed by the author.

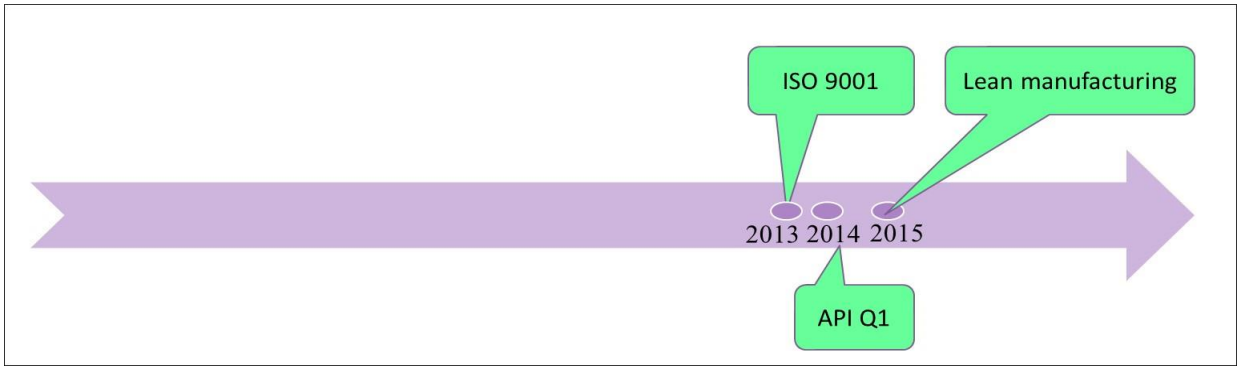
Moreover, MM4 had to attend quality management and suppliers' meetings organized by Panasonic, which displayed the supplier's performance during meeting. The suppliers were considered a failure even if they just had one rejected delivery during that month. Since MM4 produced precision parts from the foundry parts for Panasonic, MM4 discussed about the foundry suppliers which produced all the raw materials. Panasonic purchased the formed raw materials from the foundry and supplied the materials to MM4 for refining processes.

MM4 recently introduced the CI Team to drive the quality improvement activities for certain high rejection products. As for other employees, MM4 conducted a daily morning assembly at the individual department. Besides, MM4 provided a logbook as well to communicate the information.

4.1.13 MS1 QIs History and Implementation Status

Figure 4.25 displays MS1 QIs history. MS1 were certified with API in 2014. Lean was implemented around August 2015. MS1 had joined Creanova Lean programs and won the award. MS1 managing director planned to improve the company's performance via Lean or other quality improvement and luckily MITI had such a program. It is under the top management planning. When the Malaysia Productivity Corporation (MPC) visited and promoted the program, MS1 just grab the opportunity. All the employees were involved in the Lean manufacturing training. This quality improvement program is a new official program for MS1. Previously, the staff performed some improvements, but it is not official.

Figure 4. 25. *MS1 QIs history*



Note. Summarized by the author.

Besides ISO 9001, MS1 is certified with API and implemented Lean manufacturing as well. Since MS1 production is like a shop floor batch designed, it's hard for MS1 to conduct the Lean management. For make to order product like MS1, different customer will request different dimension. The timing will be off. Previously, MPC helped MS1 to implement Lean. However, it was tough to make the report and the MPC trainer stated that it might be tough for MS1 to implement Lean. Besides, it was difficult to get the data and keep the records.

MS1 certified with ISO and API due to oil and gas customers' requirements in order to get some projects, hence businesses. MS1 did emphasize that without both certification, nobody would buy their products. MS1 Managing director planned to improve the company's performance via any QIs and at the same time the government (MITI) provided grants to help companies via MPC Lean training program. Thus, MSI just grabbed the opportunity when MPC offer to execute the 12 months contract program in MS1.

During initial implementation of Lean, MS1 attended around 38 days' workshop conducted by MPC. Lean improvement program was initiated by MS1 management and there will be an official kickoff every year. Therefore, MS1 management appointed HODs as leaders and requested them to form a few improvement teams at least once a year. Currently, there are 4 projects conducted. Since MS1 only have few employees, they would open for other department employees to join while the team does not have to come from the same department. Staff involvement is essential to make the project to move on and everybody must be involved with the projects. The employees will decide which group they want to join. Then the team will go through all the processes such as brainstorming and data collection. Some of the projects are very subjective. The team is required to convert the project outcomes as data and present the progress to board of directors (BOD) for decisions to proceed with the improvement or otherwise. Normally, it will involve budgetary concerns whereby for small budget activities, the project can be implemented instantaneously.

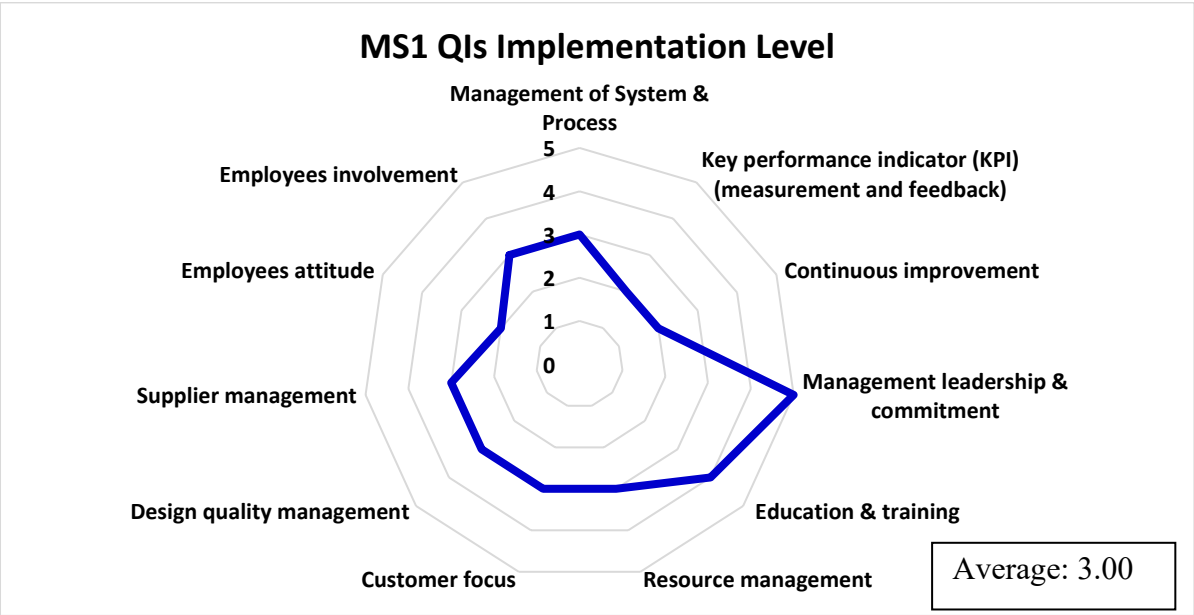
Figure 4.26 depicts the MS1 QIs implementation level with an average of 3.00 points. The most distinguishing things about MS1 implementation were related to management leadership and commitment. It was evident as demonstrated by the MS1 Chief Operating Officer (COO) who spent his time at workshop training, and frequently showed his concern about the status of improvement activities. However, MS1 demonstrated a few loopholes in the implementation. For example, MS1 established KPIs but those were for a customer named PETRONAS. MS1 submitted the KPI to meet the requirements as one of Petronas Vendor Development Program (VDP) company. There is a KPI for product quality but the KPI that

MS1 submitted to Petronas is more to system. There was a requirement from Petronas for competence staff on the number of hours of training. MS1 had to comply with the requirements. Petronas would audit MS1. Subsequently, MS1 would submit the report in the format provided by Petronas. Internally, there is no KPI. In terms of product qualities, MS1 monitor the scrap parts. However, there is only one occurrence of the part scrap. It is rare for MS1 to have a part scrap since MS1 parts and products are very expensive.

MS1 does not have weekly or monthly meeting. MS1 conducts meeting if there is a project or related issues. As for the ad-hoc improvement, the staffs are able to conduct improvement right away based on their knowledge which saves time. However, the improvements done are not reported. It is much easier since there will be no paperwork involved.

There are also some requests to improve the design internally for MS1. However, MS1 must maintain the design as per specification. Therefore, MS1 cannot simply change the design because it is related to safety issues. So, improvements conducted are more to machining design under engineering. Training is very important for employees understanding in order to ensure smooth implementation. MS1 needs participation from every employee especially from the owner of the SOPs in order to profligate the knowledge.

Figure 4. 26. *MS1 QIs implementation level*



Note. Analyzed by the author.

API standard helps to improve product quality while ISO 9001 and API Q1 help to improve MS1 management system and hence the system becomes more systematic. Previously, the responsibilities sometimes overlapped with each other. On the other hand, now it is much clearer who are responsible for the particular process. Besides that, ISO 9001, API Q1 and also API 6A are important in order to increase customer's confidence. There are only 2 companies in Malaysia that are certified with API 6A. It is difficult to get certified with API 6A because it requires the companies to prove that they are capable to fabricate and test the product. Companies could not be certified with API 6A if they purchase and conduct assembling process. There are only 3 processes (for example, heat treatment and painting) that are allowed to be outsourced while welding is not included. The company needs to do in house for other processes. As for lean, it impacts immensely on 5S activities and lesser on the products' quality, since API standard covers the products quality requirements.

There are stricter requirements in terms of training for the valve manufacturer, whereby their main customers are from the oil and gas industry. The oil and gas industry emphasize on the safety features. Therefore, MS1 need to submit the employees' competency level to customers. For example, it is compulsory for the QC to have nondestructive test (NDT) and offshore training, and for the designers who are under the engineering department to attend the offshore training as well, even though they are not involved in the production.

Another example was whereby MS1 vendor who trained the staff for the new purchased equipment. Even though the QC Department is the one that will be using the equipment, the QA engineers and production team joined the training as well. The vendor does not like to train one or two employees because they were afraid that the trained employees will resign. As for suppliers' management, some of the MS1 suppliers were not certified with the ISO 9001 but they were competent and their systems were comparable with the ISO 9001 (for example, an American, European and Italian-based suppliers).

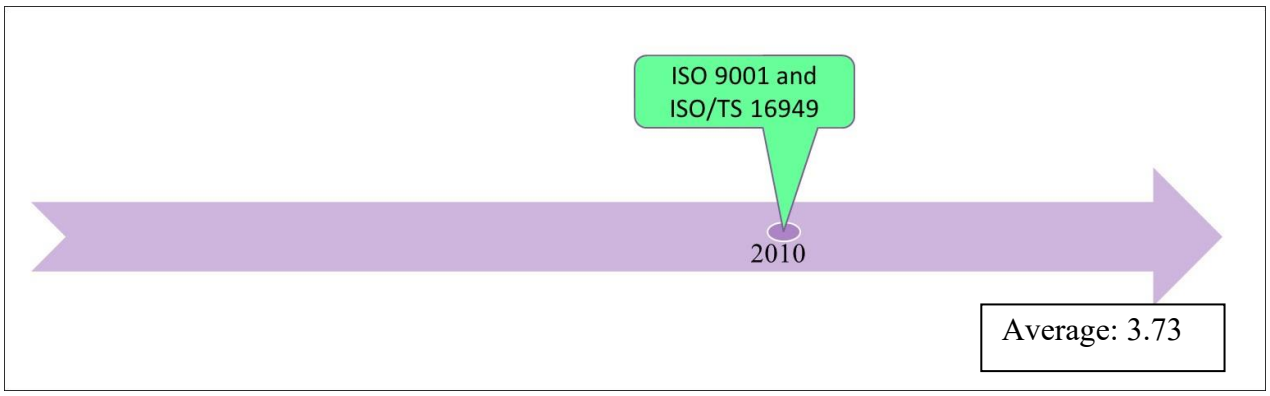
MS1 also stated that there were some changes and difference in culture. However, it was still not reaching the required level and they had a long way to go in order to achieve similar and in par with the Japanese mindset. The employees knew that they could implement the lean to certain processes, but they were complacent to go through the whole process. The culture was improving but it still needs a bit more to improve. When the habit had already set-in, it was difficult to change.

4.1.14 MS2 QIs History and Implementation Status

Figure 4.27 shows MS2 QIs history. MS2 improved quite a lot, from no idea towards the ISO 9001 implementation, the employees had improved and knew all procedures and standard requirements. All employees had at least basic knowledge toward the ISO IATF requirements. MS2 provided the training to all the employees especially executives by hiring an external consultant in 2011 and 2017. MS2 is certified with ISO 9001 and ISO IATF. So far MS2 doesn't integrate the system. However, the external auditors advised MS2 to integrate the internal audit to reduce the frequency of the internal audit. MS2 is different from multinational company (MNC). MNC have lots of section and department. However, MS2 is a small company and needs to combine many functions.

Since MS2 produce lots of products, every year MS2 conducted different improvement theme. The big thing that MS2 improved between these 7 years since the ISO implementation was increasing the employees' knowledge on how to conduct all these improvements. MS2 made a big change last year through the consultant, training and improvement implementation. MS2 adhere to the rules and regulations. Previously, MS2 did not follow the rules strictly because MS2 just started and were unaware of what they should do to comply with the requirements. Currently, MS2 have many multinational customers. They are more concerned about this system and always request MS2 to comply with the requirements. Besides that, with the QIs implementation, it became a booster in enabling companies to expand their business internationally. It is evident as highlighted by MS2 that multinational companies will easily qualify MS2 as a supplier, since MS2 is certified with ISO/IATF 16949.

Figure 4. 27. *MS2 QIs history and implementation status*

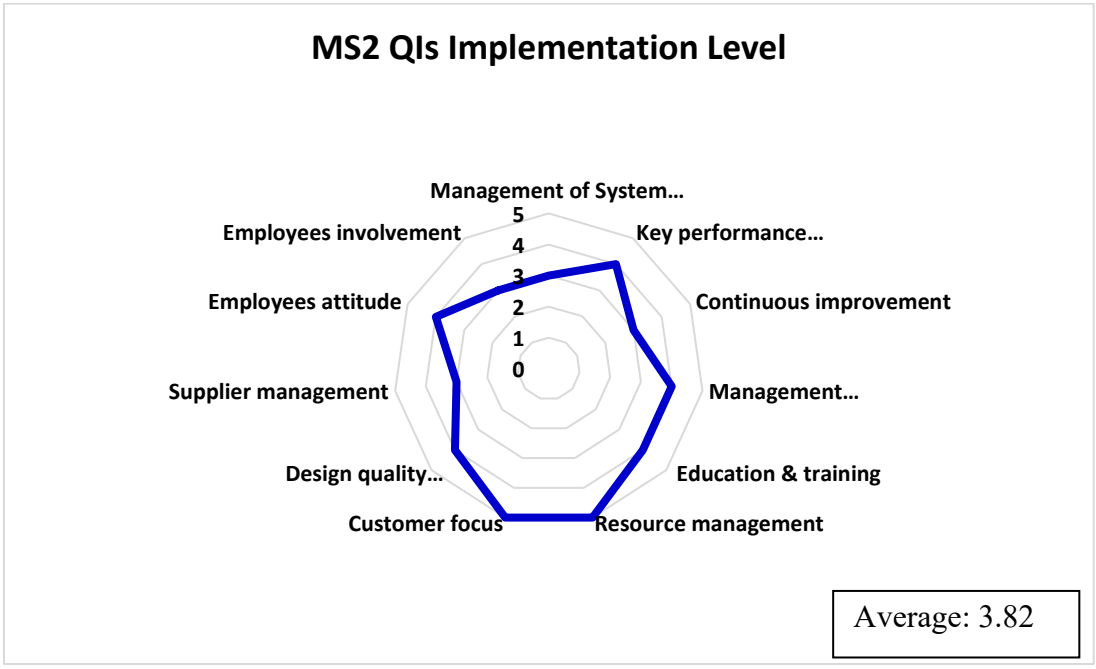


Note. Summarized by the author.

Figure 4.28 shows the MS2 QIs implementation level with an average of 3.82 points. MS2 was found to have excellent implementation in terms of resource management and customer focus. As for the resource management, MS2 utilized Minitab software, whereby MS2 found that it was quite useful and contained various analysis tools. Furthermore, MS2 even requested an external program developer to develop a supplier management and control system called OSTENDO and enhance the system over time. In terms of customer focus, customer visit is also one of the MS2 ways to capture customer expectation. It is interesting to note that sales and marketing team of MS2 often visit the customers, noted down the customer's requests and then input the requests into the system in order for the Research and Development (R&D) to develop the products based on the customers' requests. There were about 30-50 requests per month.

Furthermore, MS2 believed that the role of management is important. For example, enforcement from QMR and good management culture. MS2 has less political issue and can communicate and discuss openly to work for solutions and achieve the objectives. Culture and environment in MS2 have quite good lead from examples by the MD and GM. Teamwork is also good since the MS2 employees are very close with each other. In terms of education and training, MS2 required employees who attended the external training to share knowledge by conducting a training or holding a presentation session internally.

Figure 4. 28. *MS2 QIs implementation level*



Note. Analyzed by the author.

4.2 Difficulties, Important factors, and Benefits

In terms of difficulties in implementing the quality initiatives in Japanese companies, top management observed that there were some misunderstandings within JL1 employees. For example, some employees believed that all quality-related systems (for example, ISO 9001 and Kaizen) were under the responsibility of QA Department. Actually, QA Department only drives and controls the system so that all respective departments are able to draw specific department's direction by following each endorsed quality requirements. In order to resolve the difficulties, JL1 practices design review meetings to build better output during the two-way communication session. Besides, the meeting is expected to produce better understanding between top-bottom levels since the bottom level can utilize the meeting opportunity to voice out directly to the management. Furthermore, in the early phase of ISO 9000 familiarization, JL1 had less capability to understand the ISO 9000 system. Therefore, the top management decided to appoint an external consultant to deliver the knowledge and drive JL1 towards meeting the ISO 9000 requirement. Once the objectives were achieved, JL1 with a strong financial support had built the company by producing employees with better know-how through internal and external trainings. As an additional drive factor, monetary system was established to increase the number of participations in quality initiative programs.

Meanwhile, challenges exist in JS1 due to manpower issues such as miss-qualification, miss-assembled, and no product inspection. The challenges seem impossible to avoid because most of the processes are run manually. Indeed, the processes have less automation gate to stop the production line if anything abnormal occurred. Therefore, if customers' complaint exists at certain process, management may dispatch manpower again for OJT to further build up their capability and competency. Furthermore, certain group leaders or long-service employees (mostly foreign employees from third world countries) have no capability to produce reliable daily report (for example, writing with grammar errors). In order to overcome these difficulties, supervisors have no option but to review in detail and produce every report for top management's review. Therefore, documentation was the most difficult issue in daily production process at JS1. For JM2, due to its small-sized organization, sometimes the meeting was conducted without commitment from attendees. The reasons were over workload and manpower constraints, which results in meeting postponement or cancellation.

As counter measures, the management should be concerned about any meeting initiated by sub-ordinates and avoid any sudden reason to excuse the meeting. For subordinates, punctuality is important and even though other tasks are currently half-finished, attending

meeting on time should be the first priority because it represents personal attitude and credibility. According to the QA department from JL1 and JL3, top management shall continuously involve in any quality initiatives executed by sub-ordinates. For example, Managing Directors and managers have to be at shop floors and entertain production staff in order to accumulate advices, concerns, and suggestions, which are essential to be filtered, prioritized, and countered in such a way that it is able to fulfil the production staff's requirements. Throughout improvement in communication between management (for example, managers of QA Department) and employees may enhance the understanding of ISO 9001 company-wide and the impact to customers if any quality issues spread into the market. If products defect issues occur in the market, JL1 believes that it may directly impact the company's yearly bonus and incentives. Therefore, the most effective critical success factor is the top management commitment, which is subsequently able to educate employees' knowledge enhancement on any quality initiative programs.

In terms of education method, JL1 practices Cultivation System (CS), that contains several subjects associated with safety, environment, design review tool, and company policy. For JL3, the ISO 9001 system established in the organization is very important to guide the management in delivering full commitment to all employees. Therefore, ISO 9001 system, management, and people are three inter-related resources to drive JL3 in achieving the success of quality improvement program. For JM2, good teamwork and strong relationship between team and departments are also the key factors in order to survive in a small-sized company. Through frequent discussions and brainstorming in investigating certain issues, numbers of potential root causes could also be illustrated in the meeting room. Several brilliant ideas as countermeasures and recommendations as prevention actions are shared between team members in order to partially reduce stress level among management and workforce.

In terms of benefits, JL1 and JL3 gain numbers of benefits through ISO 9001 implementation. The management processes enter systematic ways to improve product, process, and administration, which are aligned with company policy, and enhance customer satisfaction. Conversely, some employees felt that ISO 9001 system presents inflexibility. Employees felt that they are forced to rigidly follow all requirements and rules. Regardless of any negative words, it is proven that customers strongly purchase product that are produced by ISO 9001 certified organizations. Therefore, manufacturing companies have no justification to deny the benefits of ISO 9001. Once ISO 9001 is well-managed and smoothly practiced, quality initiatives such as Kaizen and Lean manufacturing are anticipated to deliver further support to

the process and product quality towards generating higher revenue and profits. Meanwhile, most operators in Production Department of JL2 are employed from private agent to overcome domestic manpower shortage. However, due to the operators dispatched from different surviving countries and drained by agent requirements, operator turnover rate is considered high. Therefore, JL2 faced difficulties to implement empowerment and further enhance the operators' knowledge with regards to continuous quality improvement in Production Department.

Besides, various types of materials on customers' products push the company into difficulties by controlling the quality of products. Uncontrollable rejection rate in certain period of time causes the quality improvement program unable to be managed efficiently. Due to high operator turnover rate and material issues on customer products, JL2 is in the process to determine the best solutions to overcome both circumstances, whereby QA department temporarily appoints QA experts to manage and conduct weekly meeting in order to investigate problems and generate solid solutions for improvement. Therefore, the most important factor that contributes to the success of quality improvement program in JL2 is dedicating an expert to lead the program and if severe issue exists, the expert highlights the issue to top management for a final decision.

As an implication, the company is anticipated to always stay alert to reduce part rejection, prevent unnecessary cost loss, and maximize the production output. According to JS1, the existing processes can be simplified through Kaizen activity, and hence consuming minimum production cost. Subsequently, the production volume is anticipated to be increased and expose more business opportunities. All manufacturing companies, especially JM1, have no significant issue during implementing quality improvement activities due to a high commitment from the top management, close collaboration between departments, high awareness of ISO 9001 requirements, as well as attractive incentives for motivation purposes. As a result, JM1 gains various benefits such as managed to control product abnormality and achieved product compliance.

As for Malaysian companies, the difficulties and barriers faced by the companies can be categorized into internal and external factors. Internal factors originate from top management commitment, employee's attitude, manpower, education costs, and facilities investment, while external factors are derived from standard enforcement, customers, and suppliers. Internally, MM2 has difficulty in terms of top management's support and to secure the implementation cost including hiring full-time executives. The management does not fully

grasp the benefits of implementing the QIs since they cannot see the direct impact. On paper, the management sees that cost saving is RM100,000. What they understand is that MM2 spent RM1000 for people. The improvement can be monitored concurrently but doing the work is less difficult. MM2 must have one full-time PIC. The time that employees spent for the improvement program is considered cost as well.

The API response is slow, and it takes them months for the feedback. This put MM2 in a difficult situation. There are numerous layers in the API, which are considered nonsensical and waste of time. There is a need to supply to Petronas, hence the certificate is required quickly, but it is beyond their capabilities because API is the one controlling the certification. Sometimes, the Westerners emphasize that they are practicing transparency, but in the real situation, they are not.

Besides that, employee's attitude contributed to the difficulties as well. MM3 QA manager believed that ISO 9001 can improve the quality if implemented seriously. However, most people are indifferent to following the requirements. In the case for MM2, the employees involved in Six Sigma program have their own normal tasks. But, since the employees were nominated and had to focus to the process improvement as well, they had difficulty to balance the work load. Besides, the duration to implement a Six Sigma program is quite long, which is around 6 months. So the respective PICs contribution can decrease along the way. In addition to that, employees do not have high motivation to participate actively in other activities (for example, improvement project, and safety committee) besides their own job scope since the employees do not receive any incentives.

As for MM4, the difficulty lies in the CI team due to time constraint. Currently, MM4 have a lot of new models to develop. Therefore, the CI team is very busy to execute their tasks. Similar cases were highlighted by MS1 and MS2 as well. In the case of MS1, engineers, executives, and upper level involvement were good. However, they would conduct the activities if they have some free time. Unfortunately, they consider production as their priority. They would check the status if there is an upcoming audit, when a customer wants to visit the company, or when there are some issues. Most of the companies (ML1, ML2, and MM4) have difficulty to obtain manpower because the turnover rate is very high. There are many reasons for high turnover rate, such as low salary and environment factors. Besides, local employees are reluctant to do the job because it is difficult. MM4 have difficulty to find capable local programmers. Indians are the top choice as they are generally good in programming. Therefore,

MM4 hired expatriate engineers from India who had higher technical knowledge. They were very smart, fast, and able to share their opinions.

In terms of education, the companies (ML1, ML2, MM1, MM3, and MM4) hire foreigners to run production. Therefore, for the change reaction of the new employees, the companies often have to start over, conduct a program, and provide training and education at the same time. Besides, operators tend to forget the new improved process flow or products requirements after a few months. However, not much resistance is observed from the leaders and operators in the case of MM1. Most of the MM1 leaders have been working in MM1 for quite a few years. The leaders have positive attitude, whereby they readily accept any new improvement or changes.

In addition, companies might have some difficulties in getting external training due to high training cost. For example, since the training costs are all in USD and very costly, MM2 cannot afford to send the employees for the API training. To understand the changes and requirements, the respective person in charge need to understand it themselves. MM2 sent an employee for the API training, but the employee eventually resigned. That is one of the difficulties that MM2 faces. As for facilities, the database system (for example, IFS utilized by MM2) is very slow. Besides, the licenses for users are limited and not enough because MM2 has to pay for it. ML2 faces similar case. In order to execute the Six Sigma projects, ML2 needs to use the Minitab software. However, the license is very expensive and costs ML2 of about RM16,000.

From the external factors, even though it is difficult in terms of cost, MS1 still needs to comply the requirements because it is included in the standard. ISO 9001 is not difficult because it has a guideline of how the implementation should be managed. On the other hand, API 6A is a technical standard, which is very high and specific, for example, how MS1 conducts inspections and welding tests. Almost all the laboratories that MS1 outsources uses ASME as their main standard. However, 6A follows ASTM, which is a different standard. The problem is that the test is not being done in Malaysia. The procedure requires Level-3 NDT qualified inspectors. In Malaysia, there may be only 3 persons certified with Level 3. From MS2's business point of view, sometimes the ISO 9001 clause, standard, and the government rules and regulations are limiting and affect business operation. For example, in terms of material and engineering change, companies need to inform customers if there are any changes. Moreover, there is competition from other suppliers too.

ML2's difficulty is related to project kick-off. Normally, the project kick-off is short notice because sometimes the customer demands that they wanted the product within a week even though the transfer of mold is just recently. One of the reasons is due to the trade war between the US and China. ML2 does not have the opportunities to conduct a proper study such as design and feasibility study. If ML2 cannot meet the requirements and supply, the customer will approach other suppliers. Therefore, ML2 does not have any choice. Therefore, ML2 is unable to implement FMEA advance plan accordingly. Besides, QA needs to improve the supplier's quality, but the problem is that purchasing department is in charge of selecting the suppliers and QA does not have direct control over suppliers. During initial approval audit, the supplier seemed to be able to control the quality. However, if the actual products that they supply do not meet the requirements, it is quite difficult to control the production internally.

As for external consultant, MM2 management assigned an external consultant to drive the MPO improvement activities but it was not so effective as well. The companies' employees are very busy with other tasks. Therefore, they want simpler processes. But most of the MPO solutions were add procedures and forms. Consequently, the forms remain unfilled. At the end, the actual improvements implemented are just around 30%.

There are a few critical factors that should be considered to ensure QIs a successful implementation. The most important factor is the management commitment. As evidenced, many companies highlighted this as importance. For example, SGA activities conducted by ML2 really required the management's commitment to approve and create the special task team by allocating knowledgeable person, provide the authority and job delegation. Besides that, the management needs to provide investment in order for employees to execute the improvement plan. ML1's management gave support as well such as in terms of manpower. ML1 even collaborated with some universities, whereby there is an agreement that ML1 would hire about 20 graduates for every batch. As for MM1, they do not have problem with management involvement since MM1's management has diversified background and experience working in multinational companies. Subsequently, the message goes down quite easily since Level-2 management has vast experience. In the case of MM2, the management's commitment exists but it is not 100%. As for MS2, MS2 believed that enforcement from QMR and management culture were important. MS2 has less political issue and the employees are able to communicate and discuss openly to work for solutions and achieve the objectives. Culture and environment in MS2 are quite good with MD and GM leadership.

4M resources are important, as mentioned by ML2, such as: use of suitable machines, suitable parameters to control the critical points and dimensions, and allocation of resources for data collection. ML2 currently has the capability to run multiple products to survive. Besides, ML2 has various facilities to cater the customers' demand. Competency, awareness, understanding, and mentality of employees are essential as well. They have to be knowledgeable and adaptable to various situations. Similar to project management, most people do not understand how to properly manage a project. MM2 is no exception. The VPQHSE states that he is familiar with project management tasks since he had taken a project management course during his study for MBA.

Improvement method needs to be systematic to increase the effectiveness. Budget allocation for improvement is one of the critical factors. MM2 does not allocate any budget. Sometimes budget constraint from MM2 limits the employees' activities to install new equipment for improvement. Based on the MM2 VPQHSE experience from his previous working company, the budget allocation encouraged and enabled employees to conduct the improvement activities. Besides that, MM2 will have some difficulties if they do not have a full-time executive. MM2 cannot hire a fresh graduate for process improvement management and monitoring. At least the coordinator must have 3 years of working experience, independent, aggressive, and able to approach people. To monitor and ensure the project will be closed in 6 months, the coordinator needs to approach people even when they are busy. Therefore, they need to hire a quite talented person. Sense of ownership and responsibility is essential as well. Sometimes the PICs will not implement the corrective actions proposed by QA. That is why, the PICs were encouraged to give feedback and suggestions.

So far, MM3 does not have any problem in terms of money and capital. However, the improvement team sometimes lack ideas, especially related to technical knowledge. The authors asked a Taiwan company to assist regarding the problem because they know better. As for the training, HRDF fund was used, and management and workers gave full support. However, the QA manager did not think training as a good idea because sometimes the trainee did not understand and did not receive the knowledge needed. The most important is the practical on-site training, which follows work instructions and SOPs.

MS1 needs to internalize all the three improvement programs, ISO, API, and Lean. Training is very important for employees' understanding in order to ensure a smooth implementation. MS1 needs participation from every employee, especially from the owner of the SOPs to dissipate the knowledge. MM1 conducted a few activities to ensure new employees

were comfortable and able to adapt with MM1 environment. MM1 tries to provide simple tools and utilize the foreigners' language to communicate effectively. Besides, MM1 puts extra focus to train new employees who seems have difficulty and unable to understand.

As for the benefits gained, ISO 9001 is widely belief to be able in enhancing the product quality and enable the companies' system to become more systematic. Understanding of ISO 9001 requirements is essential for effective implementation, hence the expected benefits are gained as per ML1 QA manager's point of view. Time constrain is number one obstacle for people who are working in the industry. Since QA explains to others regarding ISO 9001 standard, QA needs to identify the important parts and simplified.

ISO 9001 could improve the product quality and make companies system more systematic. The ISO 9001 requirements became a norm for MM1 since MM1 has implemented ISO 9001 for quite a long time. It is a different story for TS 16949 because TS 16949 requires lots of money, especially in terms of consultation and certification. Besides, MM1 needs to execute lots of preparation because TS 16949 is more difficult than ISO 9001. Automotive customers will not accept a supplier without TS 16949 certification. They desire some world class suppliers who are certified with TS 16949 since automotive industry deals with safety aspect. They require high quality and expect that the car should be functioning well as long as the customer uses it.

One of the good things in implementing the QCC program is that it able to increase ML2's recognition from bodies like MPC. Website is very important. ML2 displays the award received at the company's website. Customers would observe and conclude that ML2 is very active and has continuous improvement mentality. Therefore, the customers would trust and approach ML2.

There are several benefits gained by MM2 from the improvement program, such as cost saving, knowledge sharing, and enhancement. Consequently, it has become the company's proprietary. Since MM2 had streamlined their operation, most employees cannot see the benefits. As for MPO, there are some benefits, such as reduced delivery time. They also hired a few new people to ensure that the operation will be more efficient, but that is considered redundant from the Vice President's point of view. Besides that, they hired a full-time manager in charge of the aftermarket (for example, spare and service). The aftermarket business is currently growing. Actually, MM2 is quite late in this area.

MM3 gained process standardization, reduced human error, and was able to expand the business internationally. MM3's customer complaints received were around 50-100 cases during 2001. However, the cases have reduced to less than 12 cases. One of the factors was due to stoppage of enamel wire production, which was a difficult process. Besides, the sales volume has reduced almost half as well due to technology change (for example, television change to LCD flat screen). Besides, there are lots of competitors from Japan, German, Taiwan, and China. China was able to produce the wire with lower grade material and manpower cost. Besides, the machines they use are new and high-speed. The customers always requested for high-quality products, but with lower costs. It was very difficult and MM3 should consider other alternatives, such as the use of lower-grade materials. Nowadays, the price is more important as compared to quality.

One of the benefits is to gain customer's confidence. If MM4 is certified with ISO 9001 plus ISO 14001, the customers feel more confident. Besides that, Japanese companies prefer ISO 14001-certified suppliers. MM4 produces some parts for automotive as well. However, MM4 is not yet certified with IATF 16949. MM4 really cannot afford to maintain this IATF 16949 since the order is not consistent. MM4 can only ensure customers that MM4 is complying with their requirements.

Initially, JZ TRW who supplied product to Proton and Honda assigned one person to train MM4 for almost two to three months. Once MM4 was ready, JZ TRW conducted an audit based on their automotive requirements. Automotive industry needs lots of paperwork and have many requirements. Customers have their own system, such as JZ TRW VIN system and Panasonic Global Procurement System. MM4 is able to land more jobs since customers gain confidence with their performance.

API standard helps to improve product quality while ISO 9001 and Q1 helps to improve MS1 management system, and hence the system becomes more systematic. Previously the responsibilities sometimes overlapped with each other. Now it is clear who are responsible for that particular process. Besides that, ISO9001, Q1 and 6A are important to increase customer's confidence. There are only 2 companies in Malaysia that are certified with 6A. It is difficult to get certified with 6A because it requires the companies to prove that they are capable to fabricate and test the product. Companies could not be certified with 6A if they purchase and conduct assembling process. There are only 3 processes that are being allowed to be outsourced. Welding is not included. The company needs to do in-house for other processes. As for Lean, the clear impact is on 5S activities and not so much impact to the products quality since API

standard covered by the products quality requirements. Customers easily qualify MS2 as a supplier once MS2 certified with the ISO 9001 and IATF 16949. Internally, there would not be many issues since employees adhere to the procedures. Therefore, arguments between departments are reduced. Besides, product traceability is manageable since ISO 9001 emphasize on traceability.

4.3 Contingency Plan and Future Trend

The economic crisis in 1997 and 2008 had impacted JL1. One of the impacts was reduced working days from five to four days. However, the management still considered the employees' situation, whereby there was no salary and manpower reduction because the crisis did not impact JL1 significantly. It is because JL1 produces diversified products, whereby most of the electrical and electronics-based companies were struggling in facing the economic crisis. For JL2 and JM1, numbers of employees received a Voluntary Separation Scheme (VSS) from the management due to the economic crisis. In addition, total hours of overtime were reduced and there was a drastic plan to control manpower due to huge reduction in demand from customers. Meanwhile, JM1 stopped the operation in certain sections in Production Department and eliminated unnecessary overhead costs as well as shifted the market sector from home appliance to automotive product.

For JL3, Business Continuation Plan (BCP) was activated during the economic crisis. Several efforts such as cost reduction and production control were taken into action to respond to the economic crisis. As JL1, no layoffs occurred but prompt action to fulfill customer demand was highly required due to the market-driven business approach. Meanwhile, JM2 controlled their overtime for employees and experienced shutting down the plant until 3 days a week only. Due to no overtime, all employees working hours were fixed to 8 hours per day and were encouraged to perform part time jobs after working hours. Similar to JL1, JM2 also did not practice employees' layoff and subsequently, VSS did not exist. Conversely, JS1 was not directly affected by the economic crisis since most of the products were shipped to HQ before being delivered to dedicated customers in Japan and other countries.

Therefore, continuous commitment from top management was requested by employees in order to further enhance the quality improvement program. Besides, a proactive teamwork was the other important element that needs to be consistently build up within the company because single manpower is impossible to achieve high-quality process and product. Therefore, JL1 strongly holds the philosophy "JL1 Way" to create co-operation from everybody to open

their mindset, open problems for discussion, and open door for interaction with internal and external parties.

For JL2, JM2, and JS1, training is one of the important factors to enhance the quality improvement program in the future. For example, employees of JL1 who have attended laser welding machine are expected to have the capability to operate the machine in Production Department. For JM2, training is part of their method to release work stress. By participating in external training at high-class venue (for example, golf resort) for a few days with plenty of foods and beautiful panorama is expected to refresh the management and employees physically and mentally from high workload in workplace. Therefore, the companies are depending on reliable workforce to operate machine and equipment in production line. For JL3, management cultivates quality mindset to all employees through fully equipped resources and continuous management support since compromising the quality of product is forbidden.

With regards to the new requirement or policy for quality improvement program, customers require manufacturing companies to comply with the ISO 9001:2015 version. In addition, JL1 are requested to submit business contingency plan for potential high-risk products. Other new customer requirements (for example, product labeling, product packaging, quick response (QR) code, Radio-frequency identification (RFID) tag, and sub material) have pushed JL1 to immediately execute action plan and physicalize the requirements before the coming dateline. For JM1, the management and employees educated their suppliers to comply with any new product requirements. Since the company is focused on automotive sector, the suppliers are also required to change certain production processes in order to align with the new requirements (for example, IATF 16949 standard).

For JS1, the company has to comply with new policy from HQ. In order to gain better understanding, JS1 appointed a consultant which is knowledgeable in employee policy. For example, once JS1 seeks the consultant's advice with regards to anti-social policy, the consultant delivers various guidance and requirements. One of the deliverables is on how to deal with employees in terms of overtime control and maximum working hours so that their daily operation follows the government rules and regulations. In terms of environmental factor, requirements for substances control are stringent for chemical-based companies to fulfill as current awareness in protecting the environment. Some companies faced barriers with regards to ISO 14001 compliance. Due to new environmental requirements, companies have to invest new machine or material towards producing environmental-friendly process and product.

As for Malaysian companies, there was no impact on ML1 because 95% of ML1 products were for the export market. Other companies that relied on materials from Japan might be affected. Since the raw materials supplied to the ML1 were mostly commodity products, ML1 did not face any difficulty to source the raw materials. ML1's strength was based on speed. ML2 and MM2 did not layoff their employees. ML2 just cut down the expenses and tried to simplify and shorten the processes and cycle time. For example, the ML2 installed a conveyor to change the process for a continuous flow and save on the handling costs.

MM1 was able to survive due to the strong customer's background (for example, Panasonic). Panasonic was not affected because it is a global company and MM1 supplied the parts to Panasonic globally. In order to survive the economic crisis, MM1 and ML2 reduced the number of working days to reduce the cost, such as electricity because the machines required a huge sum of electricity for operation. The overtime (OT) was also reduced, but that was not so effective. MM3 was not affected because it dealt with copper, which was similar to gold. When there was a price war or economic crisis, both the metal prices increased. Furthermore, MM3 exported its products to various countries, such as Thailand, China, and Taiwan. MM4 was not affected significantly with the economic crisis, however, the customers would request for their contingency plan.

MS1 was not involved in the economic crisis in 1997 and 2008 since the production started in 2012. Moreover, there was an oil and gas crisis two years ago, which affected MS1 until now. It affected all oil and gas industries including Petronas. MS1 was at the establishment stage and was certified with API, but unfortunately the economy was going down. It was considered that the Vendor Development Program (VDP) could rise up easily but it was not the case. The order quantity from Petronas was lesser. The oil price went down from RM140 to RM30 per barrel. However, even though the MS1 was struggling at that time, it did not cut the salary or layoff any staff. MS2 produced a diversified range of products, whereas previously, it focused only on one or two products. MS2 did not layoff the employees, but there was a salary cut and no overtime (OT).

MS2 recommended for the companies to conduct cost-down activities, source two or three materials, facility enhancement and maintenance, how to retain people, competition between businesses, market technology survey, enhance product technology, and visit customers frequently to get the latest news from the market. Besides, MS2 highlighted that more improvement and training were required.

As for the recommendation, ML2 are considering to invest more on the automatic machines, robotic and any other fool-proof methods (poka-yoke) in order to reduce the human dependent process and mistakes. MM1 would like to certify with the TS 16949 but it is very costly. Furthermore, the MM1 would like to implement the Lean manufacturing. In Japan, the government gives various initiatives for quality, and most of them are free. Whereas, in Malaysia everything has a price. At the end of the day, it is all about technology. The training cost per person is RM3,000, which is costly.

MM2 recommended that every company should have quality improvement activities, in line with the ISO 9001 requirements. Currently, the trend seemed to change for majority of the companies. They were more inclined to the CSR, sustainable direction. The quality improvement concept, scope and activities were defined in a limited area. The ISO 9001 encouraged the improvement, but still the impact was not quite visible. Previously, many customers requested for the improvement program. However, recently, even though it became a part of the ISO 9001, the auditors from the customer's representative seldom ask regarding the improvement program. The MM2 VPQSHE was afraid that it would be of no value in the future. Quality improvement seemed to have been left out and customers did not bother if the company is promoting quality improvement. The Six Sigma training was lesser and there was less determination in the implementation.

MM3 QA manager emphasize that companies should focus on preventive actions and improve the product design. Manufacturing should consider implementing poka-yoke wherever possible to minimize the error. The MM4 planned to implement the paperless system in the future, and enhance machine accuracy and fixture design by the product engineering (PE). As for the CI team, it was better to have one or two persons to concentrate on the job and currently, the team is available, but busy. There is a time constraint, hence, if one or two persons are assigned to concentrate in conducting the improvement work, the MM4 QA manager believed that it could be successfully conducted.

The SOPs should be compact with contents. Currently, the sentences are very long. Therefore, MS1 plans to revise and make it simple. Every year customers are asking for the price reduction but demand high-quality products. Companies have to comply with RoHS and REACH compliance. Customers would ask the suppliers to fill up the self-assessment form. Sometimes customer will visit and conduct audit. The self-assessment is usually from Panasonic, GPRC Global Procurement Research Centre. Usually, once a year MM1's senior manager goes to Japan for a new model tool meeting. Recently, there were some new

requirements from Petronas and Exxon. They requested for extra testing on the raw materials. Furthermore, Sapura emphasized that based on the standard requirements, and the company needed to witness the product testing. There would be an extra cost if the MS1 had to send a staff member to witness the test because the MS1 had several suppliers from different countries. It was difficult to go and visit all the related suppliers.

Currently, Malaysians are interested to attend the Industry 4.0. The QA manager was aware about the Industry 4.0 from the news since the government often mentioned about it while the production attended the Industry 4.0 training by government for the MS2 case. The MM4 QA manager gauged that the MM4 level might be below than 2.0. The MM4 predicted that the majority of the employees would retire and jobless if the companies implement as per the Industry 4.0. The Industry 4.0 encouraged for automation and only need one or two people to control the machines. The programmers and the personnel who knows the program will have a very good job prospect. However, MM4 will not implement until that stage.

4.4 Conclusion

There are several convergence and divergence practices identified from the QIs history and implementation status as discussed in Section 4.1. With regard to the convergence practices, first, the Japanese and Malaysian manufacturing companies management have fully utilized the ISO 9001 system in setting-up and meeting-up with KPI objectives. A management review is subsequently conducted at least on a yearly basis to evaluate the departmental performance at the end of the fiscal year. With regards to KPI, targets are listed and they require full monitoring. The concerns are closely related to reduce customer return products, customer complaints, achieve zero defect and scrap, avoid downtime, minimize cost of material and operation, ensure high supplier performance, meet on-time delivery, reach zero design error, gain high profit and revenue, as well as meeting or exceeding customers' satisfaction. Therefore, frequent management and operation review meetings are anticipated as part of the key proactive actions to achieve all KPI targets.

Second, even though management and employees realize the ISO 9001 implementation benefits, some case study companies reported that certain employees from different departments were less motivated to co-operate with the management to follow the ISO 9001 requirements. The employee's perceptions toward any quality initiatives implementation are under the QA Department responsibility. Actually, QA Department is only to drive and control the systems so that all respective departments can head in the same direction to enhance quality

and productivity by following each endorsed quality requirement. Due to less motivation, the nominated quality improvement team only focuses on their job scopes instead of driving and contributing to the quality initiative activities.

Third, due to local manpower shortage, one Japanese manufacturing company and three Malaysian manufacturing companies have to depend highly on foreign workers. Moreover, the companies experienced some obstacles, such as foreign workers and high turnover rate. These obstacles affected company focus to achieve the optimum level of production process. Therefore, empowerment effort in dedicated companies cannot be executed for any high potential workers.

Fourth, Six Sigma program is not a must-have quality initiative for Japanese and Malaysian manufacturing companies. Several reasons in impeding the implementation are anticipated even though Six Sigma program is well-practiced in other Western countries (for example, Europe, the United Kingdom and United States), such as high investment of Six Sigma trainings and strong influence of Japanese culture due to LEP.

Fifth, external consultants are appointed to educate manufacturing companies in understanding the ISO 9001 requirements. Since the Japanese manufacturing companies are practicing quality initiatives similar to the HQs, relevant information about ISO 9001 is still not enough to seek for ISO 9001 certification. Therefore, a local consultant is expected to deliver comprehensive guidance since the ISO 9001 audit will be conducted by local external auditors. Besides, Malaysian manufacturing companies also believe that external consultants may deliver similar output to companies.

Sixth, in terms of education and training, manufacturing companies have registered with HRDF for training budget purposes. The HR department have managed relevant trainings for management and employees by using the HRDF system. Besides HRDF, a special budget from the management account was utilized to cater urgent or unplanned trainings during the financial year, especially due to management direction to swift to new sectors (automotive, as well as oil and gas).

Seventh some non-large-sized manufacturing companies have financial problem to invest in new facilities (for example, latest database and high-end equipment). This situation may affect the companies' abilities to compete with the latest customer demand which is associated with the new technology. However, the respective manufacturing companies have no significant issue in terms of profit since they still sustain in the market to supply the existing products to customers.

Eighth, customer satisfaction survey is part of business culture in all manufacturing companies. Customers' participation in this survey is the best platform to deliver concerns, advice and complaints directly to manufacturing companies, without consuming a large amount of time and cost. Furthermore, manufacturing companies emphasize on compliance with the government's law and regulations released by the DOE and DOSH, which are fully responsible to protect the environment, safety and health.

Ninth, supplier's performance is also closely monitored through supplier audit and if improvement or support is required, further action plans and countermeasures are generated and executed. Through close communication between companies and suppliers, high awareness and capabilities of suppliers are strongly demanded to align with customer requirements.

Tenth, several benefits were gained through work environment and culture point of view, whereby the organizations seemed to be more structured and organized as compared to their situations before implementing ISO 9001. High awareness of employees exists to fulfil the government's law and regulations (for example, chemical waste), as well as positive attitude to perform CI, significant cost saving achievement through high efficiency in production process, and close collaboration between management and employees in business-related and social-related programs.

Eleventh, this research also explored the contingency plans conducted during the economic crisis. It was found that there were similar circumstances in Japanese and Malaysian manufacturing companies which corresponded with employee employment status, overtime, weekly working hours and operations. Most companies reduced weekly working hours, stopped overtime for employees and minimized in the number of operations during the crisis. Layoff of workers was not the companies' culture even though certain Japanese manufacturing companies offered VSS to their employees.

With regard to the divergence practices, first, Kaizen is considered as the heart of quality initiatives in Japanese manufacturing companies for CI activities to minimize production cycle time, investigate waste as well as simplify production process for better productivity. This effort can resolve production issues, such as in-process abnormality, whereby any occurrence requires a cross-functional meeting that is participated by several departments, such as quality assurance, production, engineering, and logistic. Therefore, companies which aggressively implement quality initiatives are basically supported by a strong backbone commitment from the top management and HQ. Conversely, for some Malaysian

manufacturing companies, Kaizen is not smoothly performed due to less management focus toward quality improvement, affecting the numbers of conducted SGA. Besides, some employees have limited knowledge about Kaizen. Therefore, the companies are always dealing with external consultants and several government agencies (for example, MITI, and MIDA) to conduct relevant trainings for the management and employees associated with quality initiatives implementation.

Second, most of the Japanese manufacturing companies offer a reward scheme as the official appreciation to employees with regard to quality improvement. Therefore, employees' motivation is anticipated, which is gradually increased in each executed Kaizen related activities. However, the case study discovered that one Malaysian manufacturing company believed that quality initiatives implementation did not deliver positive impact comprehensively. As a consequence, the management is not seriously focused on QIs since the main intentions are only on productivity and profit.

Third, some Malaysian manufacturing companies are unable to participate in some important external training due to the cost factor (for example, USD currency rate). The limitation in training budget is always the main constraint in small and medium-sized companies. As a proactive action, only few employees were dispatched for external trainings annually. Once the training was completed, the dedicated trainees are responsible to conduct knowledge sharing during internal trainings. Besides training, other resources, such as purchase of new machines and equipment, are also additional constraints to support the company towards high production efficiency. This environment may not typically exist in Japanese manufacturing companies, which are closely supported by HQ in Japan.

Fourth, QIs implementation is relatively easy to be conducted at the early stage in Japanese manufacturing companies. Usually, technical experts from Japan will be temporary stationed at companies to assist the preparation and set-up related documentation and processes. After a certain period when the QIs implementation has become smooth, stable and consistently being executed, the technical experts may return to Japan and new local experts or workforce may take-over the responsibility. However, for Malaysian manufacturing companies, management has to hire potential candidates or develop the existing senior staff (for example, manager, engineer, executive) through trainings so that the assign personnel are capable of initiating and executing quality initiatives gradually according to directions from the management.

Fifth, most of Malaysian companies implemented the QIs in order to obtained the legitimacy (coercive pressures from customers) while Japanese companies are focusing on internalization (mimetic pressures (benchmarking) and HQ direction (near peer coercive pressure). Sixth, source of knowledge dissemination is different whereby most of the Japanese companies received direct sources of knowledge from HQ while Malaysian companies received from various sources (training providers, multinational companies from various companies).

CHAPTER 5: NATIONAL-LEVEL FINDINGS

5.1 Introduction

From the case study interview, a few government agencies were identified to have played important roles in promoting and disseminating the QI programs, such as the training center (MPC) and research center (SIRIM) under MITI, consultant (SME Corp.) under MEDAC, and HRDF under MOHR. Besides the government agencies, training providers, consultants, and higher education entities such as universities and the Center for Instructor and Advanced Skill Training (CIAST) also contribute to the dissemination of the QIs.

5.2 Roles of Government Agencies in Quality Initiatives Dissemination

Malaysia has 23 government ministries and dozens of agencies. Every agency has their own scope of work that does not overlap with each other. For example, the Ministry of International Trade and Industry's (MITI) vision is to make Malaysia more competitive and to be one of the preferred investment destinations. There are a few agencies under MITI, such as the Malaysia Productivity Corporation (MPC) and the Standard and Industrial Research Institute of Malaysia (SIRIM). MPC focuses more in increasing companies' productivity, while SIRIM focuses on investment. Besides MITI, the Ministry of Entrepreneur Development and Cooperatives (MEDAC) and the Ministry of Human Resource (MOHR) are playing active roles that contribute to the dissemination of QIs in Malaysia.

5.2.1 MPC (under MITI)

MPC was established in 1962 in order to drive productivity for Malaysia. Among the services provided by MPC are value-added information through research and databases, development of human capital and organizational excellence via training, systems development and best practices, partnership programs, and review of regulations. MPC conducts development of capital organizational excellence via training, system development (e.g., consultancy programs), and best practices sharing. A consultancy program example is the Enterprise Innovation Intervention Program (EIIP). MPC would discuss with the companies' management on which of the consultancy program they would like to implement in the organization. MPC offers QI programs, such as 5S, Lean Management System, and QMS (ISO standards).

There are two methods for EIIP. The first method is the service requested by the companies. Based on the company's request, MPC discusses and conducts a diagnostic study to identify the company's problems, such as quality and productivity issues prior to implementing the QMS. Firstly, MPC would discuss with the management since its consultancy services involve certain fees. The standard training fees are RM4,500 per day and RM40,000 for the consultancy package, which consists of four-man day training and six-man day coaching and monitoring. The consultancy package is around 10 to 12 man days within a six-month period.

MPC would start with the diagnostics or health check for the company and identify their strength, weakness, or opportunity for improvement. Thereafter, MPC conducts a briefing to the top management to get their buy-in since this consultancy program is dependents on the top management commitment for easy and smooth implementation. It will be hard to implement if there is no commitment from the top management. Occasionally, some problems or issues may arise. MPC would start the training once full commitment from the top management is received. Usually, for the four-man day training, MPC would start with the awareness training program. For example, MPC would introduce the principles of the Lean Management System. Then, another two-man day training on tools and techniques is conducted, followed by a six-man day-training, which would be monitoring and coaching for the implementation of the solution.

As for the partnership programs, most of the collaborations are with other agencies. For example, a partnership with MITI's vendor development department was done, which was related to the vendor development program. There was also a partnership program with the Malaysian Timber Industry Board (MTIB) for the timber industry (furniture industry). Furthermore, a project was conducted with the Federation of Malaysian Manufacturers (FMM) for the manufacturing system among the FMM members. Most of the partnerships were with government agencies.

As for the interaction with other countries, the MPC director stated that QIs dissemination in Malaysia are heavily influenced by the Japanese consultants. MPC has rapid interactions with Japanese agencies, such as the Asian Productivity Organization (APO) and the Japan International Cooperation Agency (JICA). Moreover, MPC even stationed a person in charge in Japan at APO to ensure easy and smooth communication. Besides Japan, MPC previously joined a benchmarking program with Fraunhofer, but now it has slowed down. Several benchmarking programs were carried out, however there was no joint venture because

the fees were exorbitant. Therefore, currently, internal expertise is employed. The data from the Fraunhofer program could be utilized to benchmark between Malaysian companies and foreign companies under the same sector. Since a large amount of fees need to be paid, a database was developed to be used for the benchmarking unit in MPC, which was also available online. Some best practices were also included. Additionally, MPC brought manufacturing companies to join the American Society of Quality (ASQC) program to learn about quality practices from the Western perspective.

5.2.2 SIRIM (under MITI)

SIRIM STS Sdn. Bhd, formerly known as SIRIM Training Services, was established in 1994 or 1995 as a subsidiary of SIRIM Berhad. SIRIM STS Sdn. Bhd. (SIRIM STS) is an agency under MITI with 159 employees. Most of the SIRIM STS customers are from industries of various sizes such as SMEs, multinational companies, local or government agencies from many ministries. SIRIM STS focuses on the training and consultation of the industry while SIRIM QAS is responsible for certification. SIRIM STS's major business is standard-based (e.g., ISO 9001, ISO 14001 (environment), ISO 45000 (occupational health and safety), and ISO/IEC 17025 (testing and calibration laboratories)) and quality tools training. But on top of that, among the standards, there is a requirement that requires companies to conduct corrective actions and improvements. But the standards do not specify the methods the companies should utilize. This is where quality tools come into place. As for consultation, SIRIM STS guide companies' implementation from the development stage until certification. Besides training and consultation, SIRIM provides TQM and a lean management recognition scheme as well.

SIRIM STS has experts who are proficient in quality tools and quality improvement. SIRIM STS trainers receive training locally or overseas. For example, the interviewee mentioned that he gained knowledge via various training attended in Malaysia, Japan, Korea and Belgium. The interviewee attended Kaizen, lean management and QCC tools training in Japan. As for Six Sigma, he attended the training in Malaysia. He also attended an assessor training on the European Foundation of Quality Management (EFQM) in Brussel.

Furthermore, since SIRIM STS is mandated to develop and manage various standards, therefore, SIRIM STS has close relationships with the International Organization for Standardization (ISO) and the World Trade Organization (WTO). SIRIM STS takes an active role in contributing to the standards development by ISO. With regard to WTO, SIRIM STS was appointed by the Malaysian government to operate the World Trade Organization –

Technical Barriers to Trade (WTO-TBT) Enquiry Point to answer questions from interested parties regarding technical standards, regulations and assessments.

5.2.3 SME Corporation Malaysia (under MEDAC)

SME Corporation Malaysia or in short SME Corp. was established in 1996 and currently has approximately 350 - 380 employees. SME Corp. is under the Ministry of Entrepreneur Development and Cooperatives (MEDAC). The four functions of SME Corp. are the Central Coordinating Agency (CCA), National SME Development Council (NSDC), SME Integrated Plan of Action (SMEIPA), and SME Hub. SME Corp. provides grants, business advisory services, information and capacity development to SMEs in Malaysia through its SME Hub and its 11 state offices nationwide. There are few programs established to develop the capacities of SMEs such as the Business Accelerator Programme (BAP). Instead of just giving grants, SME Corp. also provides hand-holding services to expand the market and increase the SME's capabilities. Furthermore, SME Corp. provides an award named Enterprise 50 (E50) annually for 50 winners in recognition of the effort and achievements of the companies that have very good growth and meet the criteria of the E50 such as financial, operations and management competencies.

SME Corp does not conduct any specific training since many agencies provide training. However, SME Corp. assists SMEs in identifying which training is appropriate for SMEs ' current plan. SME Corp. has connections with various experts in Malaysia such as structured Industry Apprenticeship Programme (SIAP) experts and retired experts. To help the companies, SME Corp. appoints several experts to work with the companies. Before any grant is given to the company, the company needs to assess the gaps and desired targets and milestones. Once the gaps are identified, SME Corp. will assist the companies in hitting all the milestones for them to achieve the target. The capacity development program or training needs to meet the requirements of the OEMs. SME Corp. utilizes the connection with OEMs and tries to match between what OEMs need and what is provided by the SMEs.

SME Corp. has quite a few bilateral programs with Japan such as with JICA. From the cooperation, it was found that the big companies in Japan will always prioritize upskilling their local supply chain. The big companies have their presence in the industry. Malaysia's big local players such as GLCs or our OEMs like Proton, Perodua is doing a similar thing but not to the extent of the Japanese company's level. Japanese companies are not afraid to conduct the training and share the information with their supply chain.

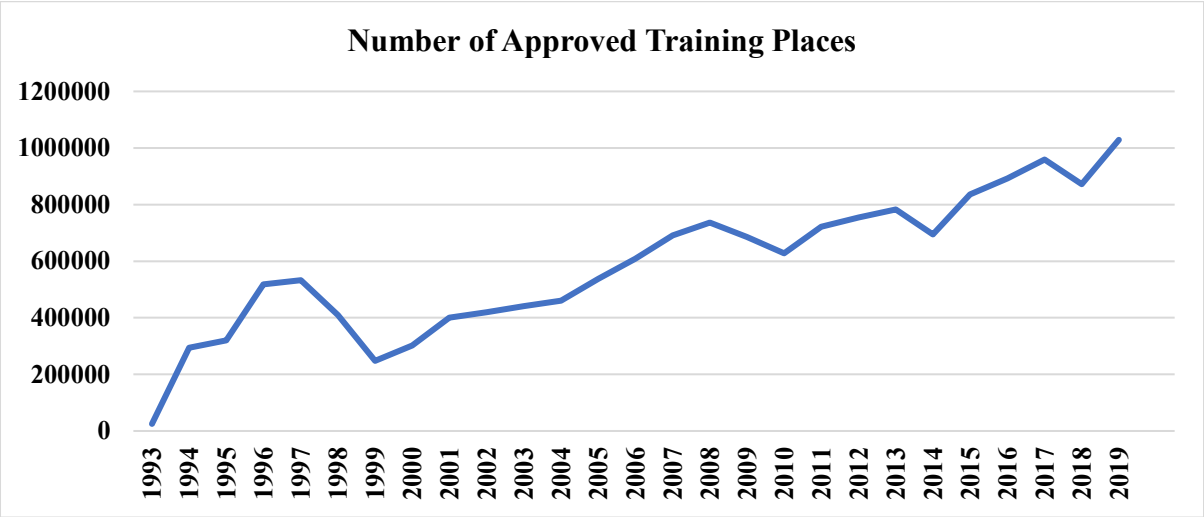
SMEs represent 97.2% of total business establishments in Malaysia in 2020. The study has shown the growth of SMEs directly impacts the growth of GDP. Even though it is true that the main contributor of GDP is the large MNCs, because of the sheer numbers of SMEs, there will be a lot of positive impacts if SME Corp. can add value to the SME's contributions. From the SME's perspective, dollars and cents which link to their profit and savings is the most important thing. However, it is quite different from the SME Corp. perspective which looks at their efficiency and productivity. Although it is good for the SMEs to be hitting KPI profits, they can save a lot more if they are efficient and productive. SME Corp. tries to encourage and make the SMEs aware of why these things are important.

5.2.4 HRD Corp (under MOHR)

The Human Resource Development Corporation (HRD Corp) was established in 1993, previously known as the Human Resources Development Fund (HRDF). HRD Corp main aim is to develop competence workforce in Malaysia, as one of the strategies in achieving Malaysia's vision to be a high-income country. Since its establishment, the functions of HRD Corp expanded from managing the funds from levy contribution by companies to other various functions, such as providing grant, industrial training scheme, job placement center and national human resource center.

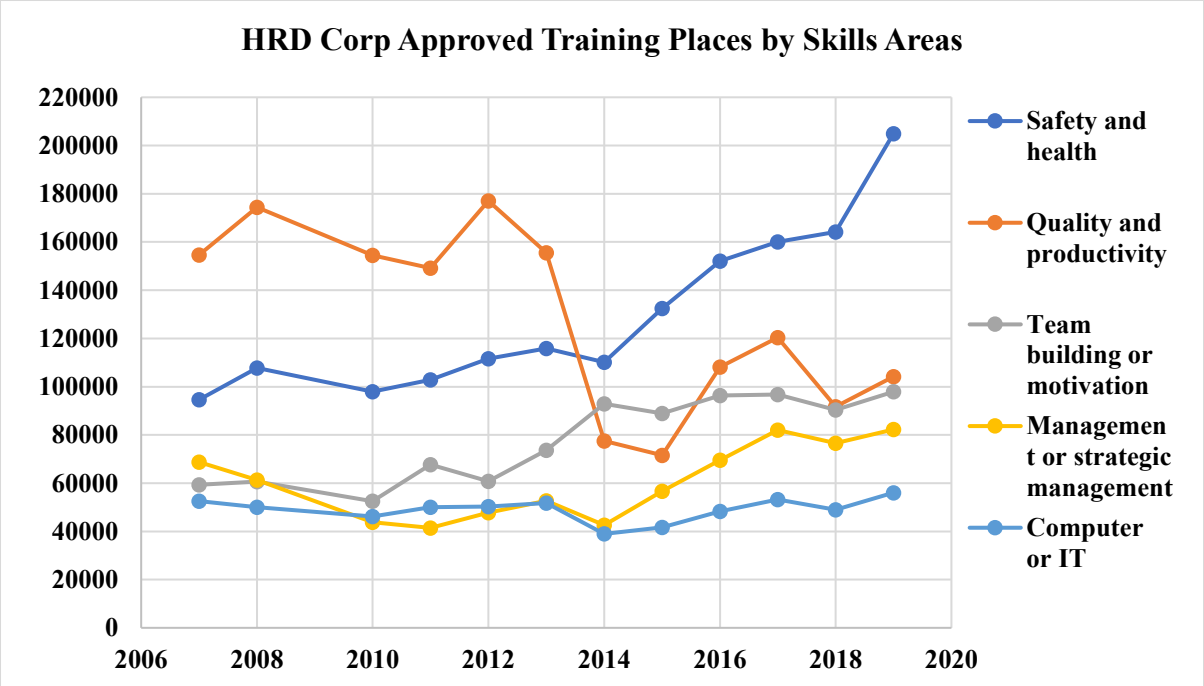
It is mandatory for companies that have ten Malaysian employees and above to contribute a certain percentage of levy (currently the percentage is set at 1%) of the employees' monthly wages to HRD Corp monthly, as per PSMB Act 2001. If employers do not utilize the fund within a certain period set by HRD Corp, the fund will no longer be eligible after the set period. Therefore, employers definitely feel the need to utilize the fund, which encouraged them to send employees for related trainings. This is evidenced when most of the case study companies mentioned that the training needed will be easily approved by management if it is claimable from the HRD Corp fund. The statement also supported by the data provided by HRD Corp, as depicted in Figure 5.1. Figure 5.1 shows the increasing trend on the number of approved training places from 1993 to 2019. A sharp decline in the trend is anticipated for 2020 due to the effect of the coronavirus pandemic. From the top five skill areas (Figure 5.2), it was found that training for quality and productivity was ranked number one for the approved training places until 2013. However, quality and productivity training steeply decreased in 2014 and its rank dropped to number two. Training for safety and health steadily increased and was ranked number one instead.

Figure 5. 1. *Number of approved training places*



Note. Analyzed from data provided by HRD Corp

Figure 5. 2. *HRD Corp approved training places by skills areas*



Note. Analyzed from HRD Corp annual reports

5.3 Roles of Education Entities

5.3.1 CIAST (under MOHR)

The Center for Instructor and Advanced Skill Training (CIAST), under MOHR, was established in 1984. The establishment of CIAST was under ASEAN Human Resources Development which was sponsored by the Japanese government. CIAST is endorsed as a training centre for instructors and subscribes to the Malaysian skills certification system that is controlled and monitored by the legal entity under the skills development department (JPK). Any program conducted by CIAST must comply with the rules and conditions set by JPK. Therefore, all training should be based on standards that are developed by the industry.

CIAST has two categories of training which are technical and soft skills for VTO (vocational training officer). The hard skills are related to automotive, electrical and electronics, mechatronics, manufacturing which consists of machining (tool and die) and welding, IT system, and computer network. As for the soft skills, it is related to teaching methodology or science of teaching on how to teach the skills. CIAST offers training to foreign trainers and training based on CIAST networking and received guidance from JICA. The program is funded by the Ministry of Foreign Affairs and the offer is channeled through the embassy of each country. CIAST has connections with the Third World countries and JICA-related countries (e.g., CLMB countries, Middle East countries and Africa) training programs that have been funded by JICA. CIAST offers customized courses requested by the countries concerned. There will be some requests from time to time. For example, CIAST has received requests from Bhutan and Afghanistan. There are 25 countries involved in these programs. The countries may make some deals through JICA and the foreign ministry. They can directly deal with CIAST as well if they are interested. Previously, CIAST received many trainers from Japan brought by JICA. However, currently, the funding is quite limited. Hence, the number of trainers is reduced.

There is a quality module included in the program syllabus in the workshop section. The electronics section does have quality management in one module. The syllabus may be included in the field of automotive but with a different name. However, the goal is still the same. For example, CIAST teaches 5S only at a certain program because the program is quite general under NOSS (National Occupational Skills Standard). For example, 5S, ISO or SPC systems are taught to convey knowledge in terms of quality. It is under the scope of quality management. Therefore, the students will be equipped with the knowledge of quality as well.

If the students join the industry later, they will not be surprised with the 5S, SPC or other quality terms.

CIAST utilizes an appropriate approach to teach 5S, ISO, or SPC based on the skills needed, for example, electronics. The course is embedded with the quality subjects, which is included in the National Occupational Skills Standards (NOSS) that is developed under the supervision of the Department of Skills Development (*Jabatan Pembangunan Kemahiran* [JPK]). NOSS is a standard developed by industry experts and skilled workers, outlining the dexterity required at certain levels of specific skills. NOSS will be reviewed around once in 5 years. Therefore, the industry will have the opportunity to recommend the NOSS content to ensure it is up to date. When they give some recommendations during the NOSS review session, CIAST will automatically apply as per the recommendation. If there are rapid changes, such as IT, they are going to abandon the old version and make it obsolete. They are going to make a new NOSS standard.

All the standards that CIAST follow were developed by JPK. For the hard skills section, Technical advisory committees (TAC) from the industry are responsible to control and manage the standard. From time to time, they will review the standard and include some new elements if any or remove some old elements that are considered obsolete. TAC will visit CIAST around 2 or 4 times a year. The frequency will be based on each field. For electronics, they will visit around once or twice per year. As for the soft skills section, TAC is not involved. However, the module will be reviewed internally once a year by reviewers.

5.3.2 Universities and vocational college (under MOHE)

It was found that universities provide a related syllabus for quality initiatives topics. For example, Universiti Putra Malaysia (UPM) included the TQM course as part of the topic for mechanical and manufacturing bachelors while quality management topic is included in the design manufacturing system syllabus. The syllabus provided to students was approved by the senate. UPM will review the syllabus every 5 years. In the case of Universiti Teknologi Malaysia (UTM), UTM provides a few types of training related to quality in industrial engi such as quality control and advanced quality. Advanced quality was introduced as one of the syllabuses in the year 2000. UTM does include the Six Sigma program but it is just worth 3 hours of the subject concerned. As for the program, UTM receives feedback from the industry advisory board every 3 years. Dr Azman from SIRIM is one of the advisory board committees. Besides the above-said subjects, UTM does provide other subjects related to quality such as

work-study for undergraduate industrial engineering students and lean manufacturing program for the Master program students. Most of the students commented that the program is suitable and they can apply to the industry. UTM wants to assist companies to improve to a certain level and wants to put the theories into practice. Some of the lecturers were involved as consultants in assisting the manufacturing companies. For example, the head of the industrial engineering program was involved in providing 7QC tools and design of experiment (DOE) training for Proton during MPC and Proton collaboration.

Interview and discussion were conducted with a vocational college as well. However, it was found that the vocational college does not provide any subject-specific quality initiatives. The vocational college does have some collaboration with the manufacturing companies to fulfil the KPI requirement that every program is required to find two companies per year. There is a list of companies that signed an MOU with the vocational college. However, the collaboration is more towards the placement of students for industrial training, and place and equipment sharing.

Interviewees from the small and medium-sized enterprises corporation (SME Corp) highlighted that the education system could not follow suit on industry requirements because the higher education only reviews its curriculum once every three to four years. The review interval is too long, but the industries change quite fast. Therefore, SME Corp conducted several discussions with the Ministry of Higher Education (MOHE) about the education required by industries. SME Corp will try to facilitate between both sides, manufacturing and MOHE.

5.4 QIs implementation in Malaysia

Malaysian industry has been exposed to QCC and TQM about the same time around the 1980s. It started with the instalment of the 4th prime minister, Dr Mahathir Mohamad who established the “Look East Policy”. From there, the government started to implement a QCC called KMM (Kumpulan Mutu Kerja). Currently, the government included the innovation element and calls it ICC (Innovation Creativity Circle). However, the fundamental concept is still the same. The government started to implement ISO 9001 during Ahmad Sarji’s leadership. At that time, Ahmad Sarji was the SIRIM chairman. He started to instruct the government agencies to be certified with ISO 9001. He observed the ministry’s condition and identified which department will benefit from ISO 9001 implementation. Since then, many government

agencies started to embark on ISO 9001 quality management systems including hospitals, JPJ, forces such as military/army and police, schools, and universities.

Table 5.1 summarizes the relationship between national and international agencies. MPC has a wide connection with the international agencies, which are related to quality and productivity development from Japan, Germany and the United States of America. JICA has various partnership with Malaysian agencies, such as MPC, SME Corp and CIAST, indicating that JICA provides a huge influence to the source of knowledge on QIs implementation in Malaysia.

Table 5. 1. *National and international relationship between agencies*

Agencies	MPC	SIRIM	SME Corp	HRD Corp	CIAST	University
National						
MTIB	✓					
FMM	✓					
MOHE			✓			✓
SIAP			✓			
Training providers				✓		
SME Corp						✓
International						
APO	✓					
JICA	✓		✓		✓	
AOTS	✓					
ASQC	✓					
Fraunhofer	✓					
ISO		✓				
WTO		✓				

Note. Summarized by the author.

All the agencies have taught QCC tools, improvement tools, Kaizen and many other tools since the 1980s. It has been taught practiced for quite a while in industries. Malaysian companies started having exposure to the QCC tools and started having the awareness of the need to implement improvement after they were exposed to the QCC initiative. Furthermore, there is the Six Sigma and other various initiatives. However, even with this kind of exposure, Malaysian companies still have lack of skills in utilizing the quality improvement method. For example, MPC interviewees highlighted that the companies were implementing basic 7QC tools only and seldom utilize new advanced QC tools. Another example is that SIRIM STS introduced an idea of the quality cost. However, so far there is no company that actually implement the quality cost. One of the reasons is because it is hard to calculate and companies

need accountants to participate. It is quite straightforward to convert the reject rate into monetary terms. Moreover, in terms of subjective cost, such as energy reduction and quality audits, it is not easily calculated. For example, the quality audit. Companies can calculate based on the auditors' fees, which are paid in a particular month. However, companies need to convert the improvement in terms of cost savings to determine the auditors' involvement in the quality audit. It is quite tedious to do the calculation. This could be the reason companies were a bit reluctant to implement the quality improvement method.

ISO 9001 quality management system is the main impetus to the culture of practicing or embracing quality improvement in the Malaysian industry. There is a clause in ISO 9001 which required the companies to conduct and show that they are practicing quality improvement. Without ISO 9001, the culture of improvement is quite questionable. ISO 9001 causes or forces staff to prove that they are carrying out improvement activities. If you are certified with ISO 9001, you must have evidence that you are practicing quality improvement. Before ISO 9001, companies may have little cognitive ability to relate the quality improvement towards the companies' productivity and working environment. Another reason is the employees' attitude. When it comes to issues like an engineering issue, employees think that it is under management's responsibility. However, quality is everybody's responsibility. Everyone at all levels is responsible for quality. ISO 9001 emphasizes customer focus. The responsibility towards quality is leaning to a better understanding that everybody has to be involved. In the early 1980s, people thought that it was a management task. So, gradually the mindset changed due to the standard and the exposure received. The employees started to understand.

However, based on the consultant's observation, it is still not yet a culture in Malaysian companies to improve company issues. The employees know it is a problem, but they do not have the initiative to solve the problem. Another thing is that employees do not realize that it is a problem. They have been doing the job for quite a long time and that is how they do the job. They just do the job without thinking of a way to improve it. The quality mindset is still not there. They are getting used to the situation and environment.

The level of benefit gained from the QIs implementation is related to the organizations' starting point. For example, companies are not thinking what the benefits that they will be able to receive from the ISO 9001implementation. The companies just want to implement the ISO 9001 because they want to be certified due to customer requests which are instructing them to go for ISO 9001. The companies do not ponder in depth the benefits of the implementation.

Those companies that do not look at this perspective will not bother about the implementation of progress. Companies rarely view ISO 9001 from that perspective. 85% to 90% of the companies going for ISO certification mostly because of the customer's requirement. ISO 9001 is like a chain of a chain effect. For example, company A supplies some products to company B. Company B is implementing ISO 9001. These 2 companies wish to speak in the same language. Company B will ask their suppliers to certify with ISO 9001. When a company is certified with ISO 9001, the company needs to conduct a selection of suppliers and evaluation of suppliers' performance. It will be easier if the companies requested the suppliers to implement ISO 9001. The suppliers will understand why the company have to conduct suppliers' evaluation.

5.5 Conclusion

The "Look East Policy" is the starting point that stimulate QIs implementation in Malaysia, especially in the government ministries and agencies. It was found that government agencies (MPC, SIRIM, SME Corp and HRD Corp) and education entities (CIAST and universities) played active roles in disseminating QIs in Malaysia. Agencies and education entities received assistance from other developed countries, such as Japan, Germany and the United States of America. It could be observed that Japan provides a great influence in disseminating the knowledge of QIs. It is evidenced that most Malaysian government agencies mentioned that they are having certain program, or partnership with Japanese agencies and consultants. However, in spite of various efforts in disseminating QIs implementation, Malaysian companies still have a long way to achieve similar level of implementation compared to the Japanese companies. The Malaysian companies are still unable to fully utilize the implementation, cognitively it relates to the improvement and benefits, and embeds the improvement culture. However, from observations, the idea of quality is becoming a norm to Malaysians because most of the companies and government agencies are implementing certain QIs to demonstrate that they are capable and meeting basic standard requirements.

CHAPTER 6: ANALYSIS AND DISCUSSIONS

6.1 Introduction

Table 6.1 summarizes the four QIs implemented at the visited companies. It was found that most of the Japanese companies were certified with various ISO standards except for JS1. The Malaysian companies were certified with various ISO standards as well except for ML1, MM1, and MM3. As the ISO 9001 standard becomes highly institutionalized, the quality performance becomes a leverage. Companies have difficulty to differentiate themselves from competitors. Therefore, the companies pursued certification with other standards as one way to differentiate themselves, showcase their capabilities, and gain social legitimacy.

As for Kaizen, most of the Japanese companies implemented Kaizen especially at the management and group levels. Large Japanese companies even expand the implementation up to the individual level. As for Lean Manufacturing, only JL1 mentioned the implementation by establishing an OEE department focusing on reducing wastes. One of the reasons contributing to the lesser rate of implementation is maybe due to the practitioners' assumption that Lean Manufacturing is equivalent to line balancing and is not suitable for the companies' manufacturing system as quoted below by MM1 and JS1.

"Lean Manufacturing is suitable for assembly product because the production line from I line can be changed to U cell line or standing position. However, it is not effective for injection molding" (MM1 manager).

"For example, in an electronics and electrical factory like a TV manufacturer, it is easy to make a production line and produce the products. You can choose the line and observe the situation and investigate further such as take the process time and compare it with the previous line. For make to order product like MS1, different customer will request different dimension. The production cycle time will be different. It is hard for MS1 to compare the productivity based on the products' cycle time."

As for Malaysian manufacturing companies, the companies implemented Kaizen at the management level but there was less implementation for group and individual levels. It was found that Lean Manufacturing was implemented in MM2 and MS1 while Six Sigma was implemented in ML2 and MM2.

Table 6. 1. *Overview of QIs Implementation*

Company	Management systems	Kaizen			Lean manufacturing	Six Sigma
		Management level	Group level	Individual level		
JL1	ISO 9001, ISO 14001, OHSAS 18001	√	√	√	√	
JL2	ISO 9001, ISO 14001, OHSAS 18001	√	√	√		
JL3	ISO 9001, ISO 14001	√	√	√		
JM1	ISO 9001, ISO 14001	√	√			
JM2	ISO 9001, ISO 14001, AS 9100	√	√			
JS1	ISO 9001	√				
ML1	ISO 9001	√				
ML2	ISO 9001, ISO 14001, OHSAS 18001 and IATF 16949	√	√	√		√
MM1	ISO 9001	√				
MM2	ISO 9001, API, ISO 14001, OHSAS 18001, ISO IEC 17025	√	√	√	√	√
MM3	ISO 9001	√		√		
MM4	ISO 9001, ISO 14001	√				
MS1	ISO 9001, API	√			√	
MS2	ISO 9001, IATF 16949	√				

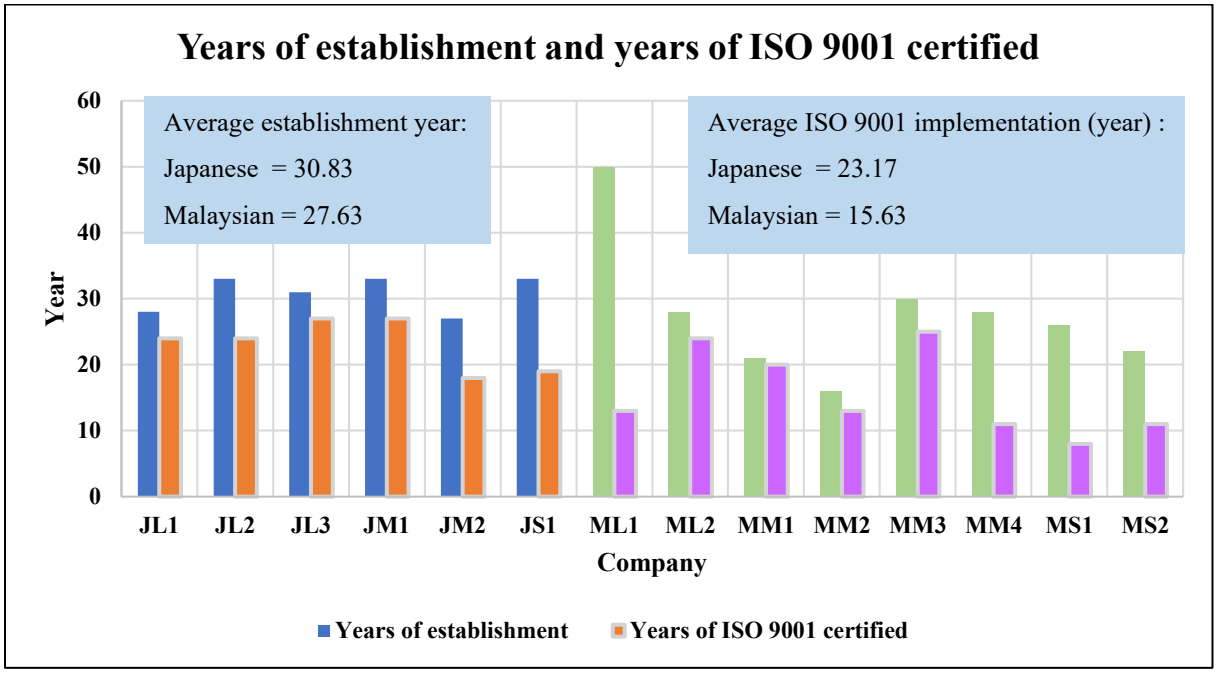
Note. Summarized by the author.

6.2 Quality Management System (ISO 9001)

Figure 6.1 depicts the years of establishment and years of ISO 9001 certification for both the Japanese and Malaysian companies. On average, the Japanese companies were established 3.2 years longer than the Malaysian companies. Furthermore, the Japanese companies were certified 7.54 years longer compared to the Malaysian companies, indicating that Japanese companies have longer experience in operation and ISO 9001 implementation. Furthermore, Figure 6.2 shows the lagging periods in implementing ISO 9001. It was found that the Malaysian companies in average took 3.08 years longer to implement ISO 9001. ML2

had the longest lagging period, which was 21 years, followed by MS1 and MM4 with 18 years and 17 years, respectively. As for the Japanese companies, the lagging periods were below ten years, except for JS1.

Figure 6. 1. *Years of Establishment and Years of ISO 9001 Certified*

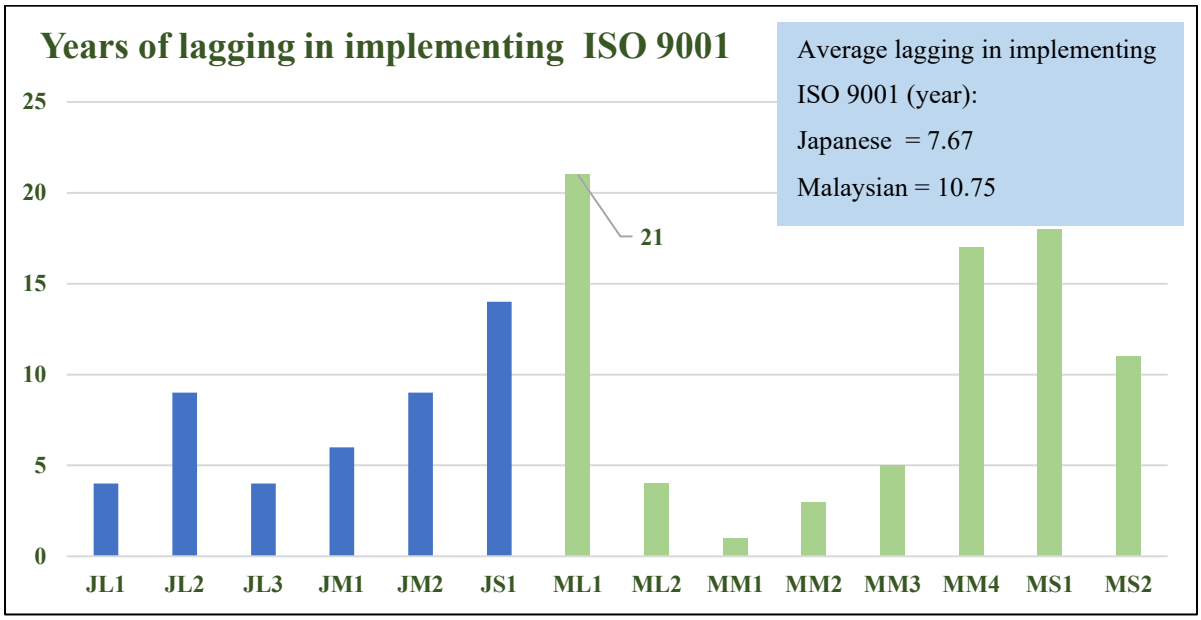


Note. Analyzed by the author.

ML1 is located in the central region and producing plastic-based products (e.g., adhesive tapes). The company is considered of having less awareness on the importance of ISO 9001 certification. Even though the company was established in 1971 (almost 50 years), the company was certified with ISO 9001 for less than 15 years, which is 21 years after the establishment of ISO 9001 in1987. The lagging period was due to several reasons, such as the nature of business operation, whereby most of ML1 customers are end users (e.g., customers directly purchased retail products, such as stationary) who are not highly concerned on high-quality product criteria to fulfill fast-moving product requirements, and low top management commitment to drive the company toward strictly meeting quality requirements (no quality improvement program embedded) before delivering to retailers.

"Because for retails, they are not thinking much on the quality. They are more focused on the speed. We do not conduct frequent meetings, talks or give rewards. For us, it is just nonsense. That's why we do not implement it."

Figure 6. 2. *Years of Lagging to Implement ISO 9001*



Note. Analyzed by the author.

Even though the top management passively reacted to the benefits of ISO 9001 for proper quality control and systematic documented system, ML1 was finally accredited with ISO 9001 in 2005 in order to sustain with high-quality market requirements, especially in competing with other progressive competitors domestically and internationally.

As for MS1, it is a trading company until it expanded the operation in 2012 to the manufacturing of oil and gas valve. It is important for manufacturing companies to be certified with ISO 9001 to secure the market. Therefore, once MS1 started the manufacturing operations, MS1 immediately embarked on the implementation of ISO 9001 and was certified in 2013. With regard to MM4, initially MM4 was operating the turning process without holes. The operation is quite simple and MM4 did not feel the necessity to implement a proper system, such as the ISO 9001. However, when the operation became complex with drilling and CNC machining, the need to have a proper system is significant. Additionally, MM4 had a new generation wave, which was led by the Executive Director (ED). MM4 gained new perspectives and ideas from the younger generation employees, who were eager and energetic toward achieving a better quality improvement. Furthermore, it could be observed that MM4 had close relation with big customers, such as Panasonic and ZF TRW. Therefore, MM4 definitely has to demonstrate to the customers that they are implementing a proper system and capable to produce the products.

Meanwhile, there was no significant difference for the remaining manufacturing companies with regard to the lagging period issue because the top management was fully aligned and knowledgeable on the market requirements in order to gain positive perceptions from surrounding parties (e.g., external auditors, consultants, competitors, and customers). Furthermore, the end products are expected to enter the high-quality zone, which might potentially increase the percentage of domestic market share. For instance, the top management of MM1 quoted as follows:

"The very good thing about MM1 is the management team, they actually come from a big organization. The MM1 director was an ex-director of Company A. Mr. A was from Company X, and Mr. B was from Company Y. The management's background is mixed. It makes it easy for the management because they are educated and familiar with the system."

All the manufacturing companies were ISO 9001 certified. Some of the manufacturing companies went the extra mile to gain additional certification from other relevant standards such as IATF 16949, AS 9100, API, ISO 14001, OHSAS 18001, and ISO IEC 17025. The headquarters (HQ) of Japanese manufacturing companies instructed all overseas branches including branches in Malaysia to achieve ISO 9001 certification. Therefore, all the Japanese manufacturing companies in Malaysia immediately fulfilled the company policies established by the HQ in Japan. With regard to this effort, the practice is aligned with other researchers who reported that multinational company practices and work culture (e.g., policy, mission, vision, rules and regulations) are obligating to the HQ coercive pressures. Malaysian companies received coercive pressures to achieve ISO 9001 certification due to the business power from customers.

Moreover, both Japanese and Malaysian manufacturing companies are seeking performance benefits as well from the implementation in order to improve product quality and productivity. Based on systematic documentation for each process in the product roadmap, the companies are moving forward to continuously enhance quality of delivered products, whereas the profit and margin presented in the monthly reports showed potentially gradual growth. Subsequently, ISO 9001 implementation might support the companies in increasing productivity and reducing the rejection rate throughout the year and strengthen the achievement gained in KPIs or quality objectives departmentally and companywide.

“We want to improve the quality of the products by fulfilling ISO procedures and recommendation. Hence, it is much easier to manage the products”, quoted by the Quality Manager of MM1.

“By producing quality products, companies are able to avoid loss of cost control and move the company to enhance high productivity”, quoted by the Quality Manager of MS2.

“ISO 9001 is beneficial in achieving set KPIs, whereas the current percentage of rejection rate by customers (ROG) is 2%, as compared to 4% of ROG last year”, quoted by the Quality Manager of JL2.

Besides, continuous quality improvement programs and countermeasures are conducted to overcome further process inefficiency and product defects. Customer voice corresponding with defect and quality below expectation is very essential for further consideration during management review. One of the efforts to assess customer voice is through periodically meeting with customers. In this case, the customers are other companies who purchase the products from the companies in the case study.

For JS1, the management was personally trained by ISO experts to enhance the understanding on how to maintain the current ISO standard and plan for future actions in meeting the ISO requirements. Meanwhile, the training was also part of ISO requirements, which included the management, ISO representatives, and respective ISO-related employees from every department.

6.3 Implementation of Kaizen

Based on Table 6.1, the top management of all fourteen companies were committed and fully supported the practicing of the well-known QI, which is Kaizen. However, the level of top management involvement was anticipated to be subjective and mixed. Besides, the employees’ awareness related to the Kaizen activities differed since some of the companies did not construct Kaizen activities companywide. For example, there was no group and individual involvement for Kaizen activities at six Malaysian manufacturing companies (ML1, MM1, MM3, MM4, MS1, and MS2) and one Japanese manufacturing company (JS1).

Even though the implementation of Kaizen was driven by the management, only a few of the studied companies especially Japanese companies were fully aware of the high value of

Kaizen. All six Japanese manufacturing companies had no doubt the power of Kaizen in supporting the manufacturing process in producing high quality products. Large-sized manufacturing companies (JL1, JL2, and JL3) established Kaizen groups to react to the HQ direction by forming GATE (for company JL1) and small group activities (for companies JL2 and JL3). Meanwhile, all the three companies encouraged their employees to continuously generate new innovative ideas to increase process efficiencies.

"As for Kaizen, our company follows the HQ principle policy in order to continuously improve all production processes", quoted by the Quality Manager of companies JL2 and JL3.

For the other three small and medium-sized Japanese manufacturing companies, the level of Kaizen implementation was moderate because Kaizen has been culturally implemented for years through genba Kaizen (for Company JM1) and performed on an ad hoc-basis to resolve quality issues (for companies JM2 and JS1).

Regarding Malaysian manufacturing companies, Kaizen gained less attention from the management. Due to this circumstance, all eight manufacturing companies fully relied on the employees to initiate and decide in practicing Kaizen. Only Company ML2 showed that Kaizen was practiced as a QI program since the management encouraged the employees to form Kaizen small group activities focusing on CI in terms of cost saving. Conversely, there was no evidence with regard to Kaizen groups in the other manufacturing companies (ML1, MM1, MM2, MM3, MM4, MS1, and MS2).

However, out of the fourteen companies, MM2, which is a medium-sized company that produces M&E products, practiced three main QIs (Kaizen, Lean Manufacturing, and Six Sigma) due to the driving force initiated by the institutional entrepreneurs, VPQSHE, who are knowledgeable and have various working experience from diversified companies.

6.4 Implementation of Lean Manufacturing and Six Sigma

In the meantime, MM2 also continuously implemented Lean Manufacturing and Six Sigma in its daily production process. Since the participation of individuals was highly significant to support the production line, the company realized that Lean Manufacturing and Six Sigma practices brought similar benefits with the SGA implementation. Therefore, most of the companies were reluctant to apply both practices companywide. As evidence, approximately 71% (ten companies) and 93% (thirteen companies) of the studied companies

are anticipated to ignore the benefits of Lean Manufacturing and Six Sigma respectively regardless of being Malaysian or Japanese manufacturing companies.

With regard to Lean Manufacturing, Malaysian manufacturing companies showed higher attention as compared to Japanese manufacturing companies. Companies MM1, MM2, and MM3 initiatively performed Lean Manufacturing by PIC since these companies were eager to improve product quality consistently by collectively resolving any quality issue.

"We want to improve gradually and that is why we need better quality products", quoted by the Quality Manager of Company MM1.

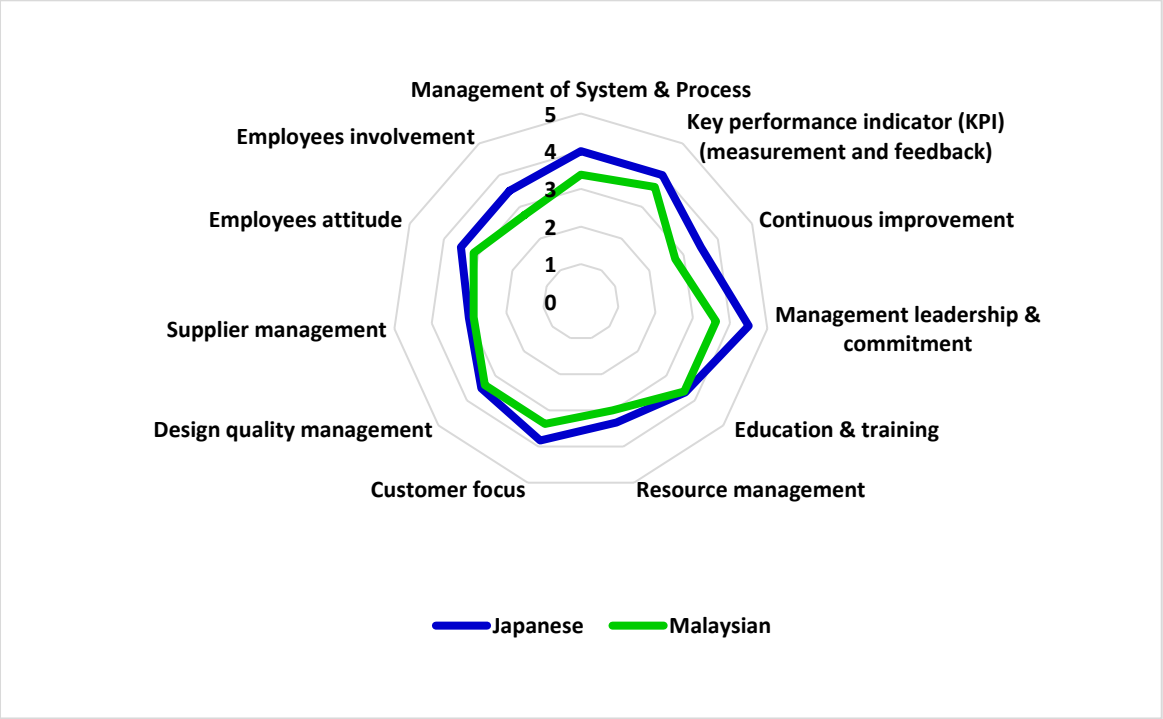
Similar to ISO 9001 and Kaizen, Company JL1 also performed Lean Manufacturing as directed by its HQ in Japan. The implementation of Lean Manufacturing in manufacturing industries in Malaysia was relatively low as compared to ISO 9001. As for Six Sigma, all the Japanese manufacturing companies did not have high concerns on Six Sigma even though certain companies unofficially implemented the Six Sigma concept such as appointing external training companies to educate employees in executing CI activity. However, the implementation rate was quite low. For Malaysian manufacturing companies, only MM2 presented reasonable evidence on Six Sigma implementation because the Quality Assurance Department resolved quality issues proactively for a certain period of time. However, the proactive actions were halted due to recession, the loss of reliable coordinators, and different waves of direction as demonstrated by MM2's top management by only focusing on company profits rather than comprehensive quality improvement program or project.

6.5 Within-case and Cross-case Analysis

Figure 6.3 shows the QI implementation level comparison between Japanese and Malaysian companies. It was found that overall, Japanese companies indicated superior implementation level as compared to Malaysian companies. However, Malaysian companies' level were quite on par with Japanese companies in terms of education and training, design quality management, and employees attitude. For education and training, the companies are able to leverage with each other because a government agency called HRD Corp enforces the companies to contribute 1% of levy for each employee monthly. This fund can be claimed for training purposes. Thus, this fund enables and encourages companies to conduct related training, hence increase the employees competencies. As for design quality management, the

practices vary depending on the products and customers that the companies supply to. For example, adhesive tape manufacturing companies have full control in product design management, while injection molding manufacturing companies depend on customers' drawings and specifications for product design. As for employees' attitude, the companies do have foreigners and high turnover problems that impede the effort in building positive employee attitude.

Figure 6. 3. *QIs Implementation Level Comparison Between Japanese and Malaysian Companies*

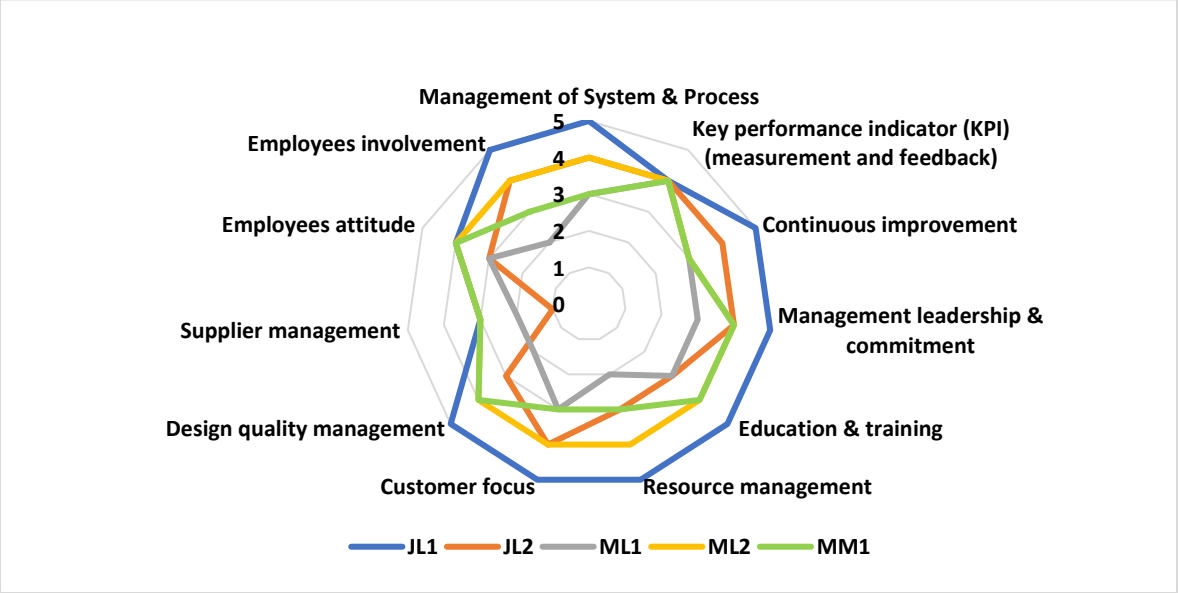


Note. Analyzed by the author.

Three comparison analyzes were made based on the studied sectors. Figure 6.4 depicts the QI implementation level for companies operating in the plastic sector. JL1 showed superior QI implementation as compared to the other companies. JL1 had a superior level of implementation because JL1 had a proper system in place to ensure the improvement implementation rans continuously with little disruption. For example, JL1 designated committees (GATE committee) and department (OEE department) to oversee the activities. Management commitment was visible even up to the operator level since the management frequently conducted patrol or Genba and joined various meetings. JL2, ML2, and MM1's implementation levels were quite the same except for ML1. ML1's QI implementation level

was quite low because most of ML1's customers are from the retail sector that is more concerned about speed then product quality. Therefore, the coercive pressures from customers in terms of quality is very lenient.

Figure 6. 4. *QIs Implementation Level Comparison Between Companies in Plastic Sector*

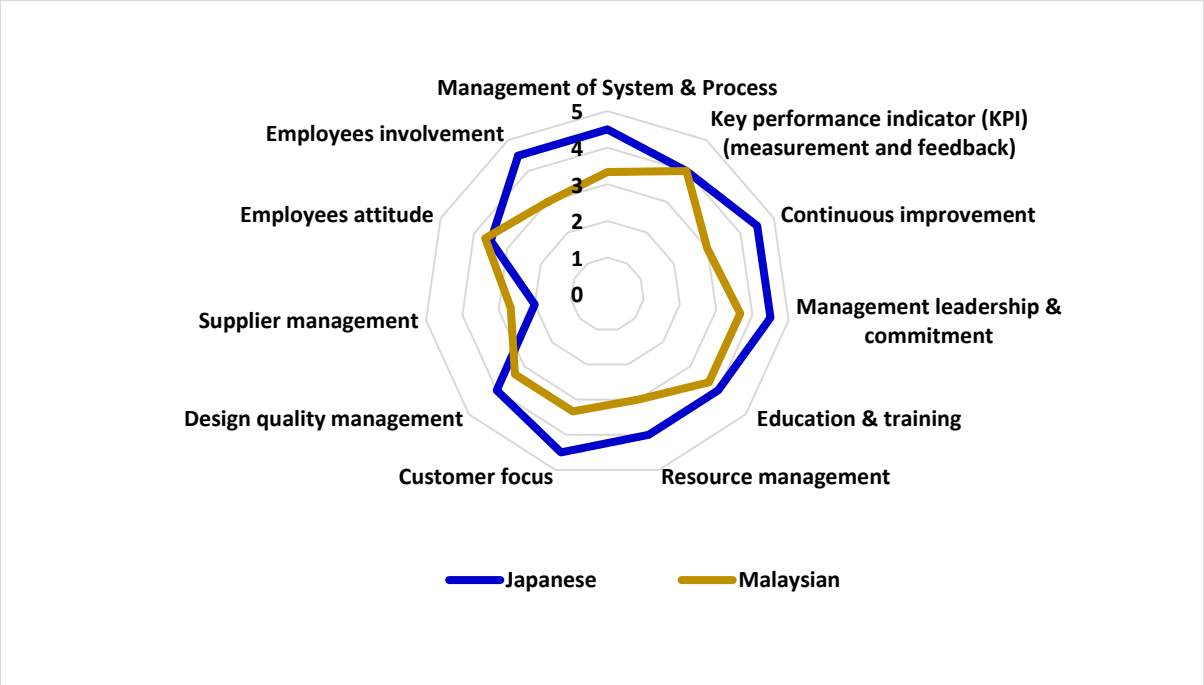


Note. Analyzed by the author.

Figure 6.5 shows the QI implementation level comparison between the Japanese and Malaysian companies in the plastic sector. It was found that Japanese companies had a higher level of implementation except for supplier management. This was due to the fact that JL2 did not request suppliers to be certified with ISO 9001 and some of the suppliers were controlled by customers especially for raw material.

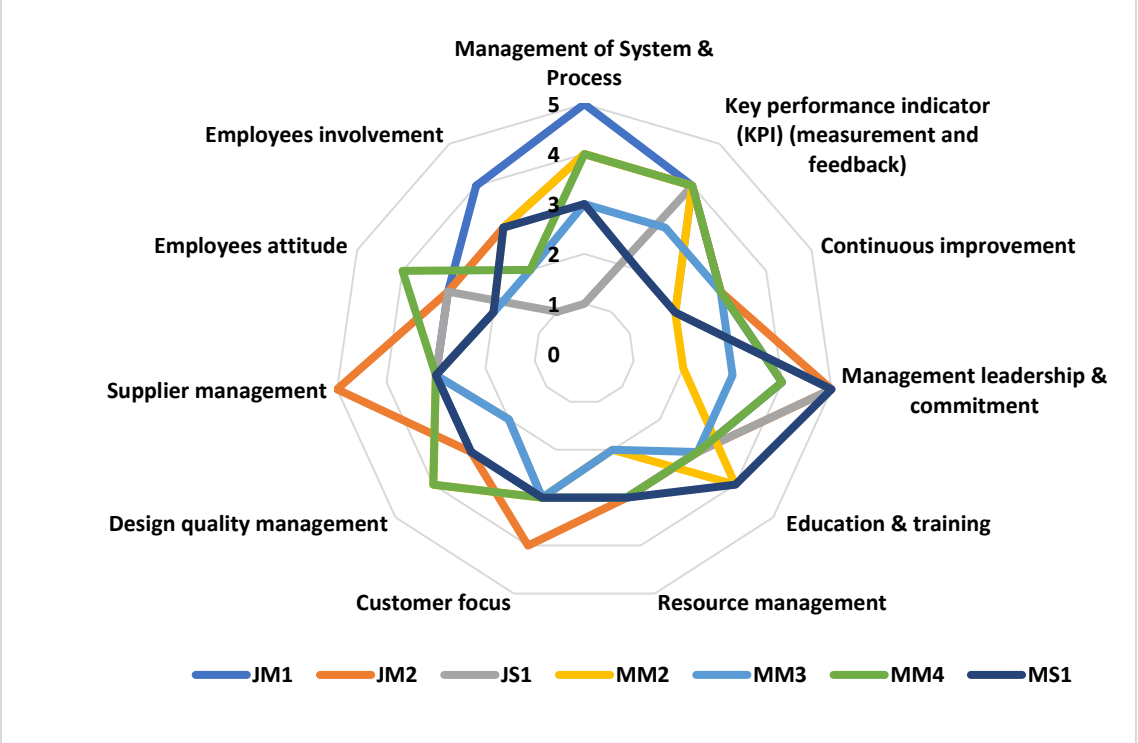
Figure 6.6 displays the QI implementation level comparison between companies in the M&E sector. There are mixed results showing some companies exceled in certain practices while being quite weak in some other practices. JM1 is a big Japanese multinational company. Thus, JM1's management of system and process was expected to be good since it received guidelines and expertise support from HQ. As for JM2, it focused on supplier management since it produces precision parts with material quality (e.g., casting part), substantially relying on suppliers' product quality. MM3 showed loose control on design quality management because the manufactured products (wire) are not complex. Besides, MM3 and JM1 are located at the upstream of the supply chain, thus the products that they supply will be converted or assembled at the customer site.

Figure 6. 5. *QIs Implementation Level Comparison Between Japanese and Malaysian Companies in Plastic Sector*



Note. Analyzed by the author.

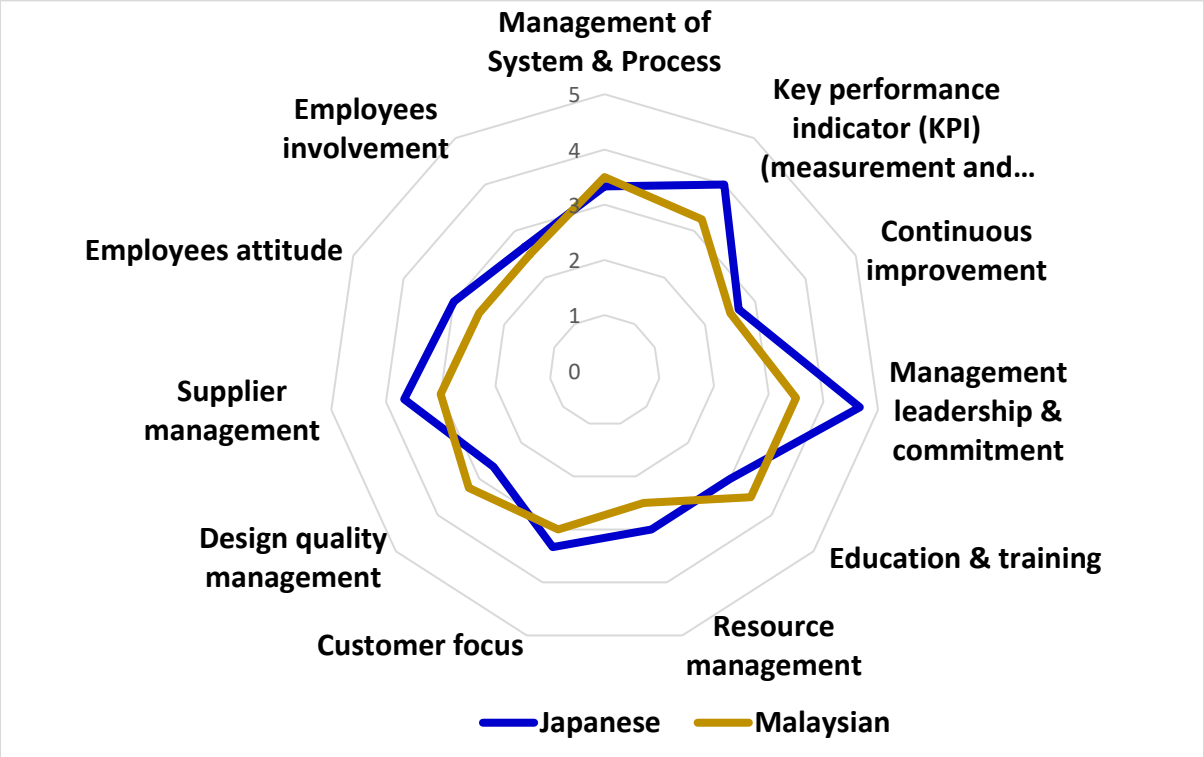
Figure 6. 6. *QIs Implementation Level Comparison Between Companies in M&E Sector*



Note. Analyzed by the author.

Figure 6.7 depicts the comparison between Japanese and Malaysian companies in the M&E sector. It was found that Japanese companies were superior on most of the elements except education and training, and design quality management. It was found that MM2 and MSI contributed to higher levels of education and training. Managers in MM2 had diversified improvement experience and ability to train and guide employees. As for MS1, top management's coercive pressure stimulated the desire to improve by hiring a consultant from MPC to guide the improvement implementation. MM2 and MM4 contribute to higher level of design quality management for Malaysian companies because both companies produce precision parts which require higher level of quality management and critical control. It is interesting to highlight here that even though JS1 produces valves similar to MM2 and MS1, the PIC did not know about the API Q1. This is because JS1 supplies products to a different sector, which is waterworks, as compared to MM2 and MS1, which supply the products to the oil and gas sector.

Figure 6. 7. *QIs Implementation Level Comparison Between Japanese and Malaysian Companies in M&E Sector*

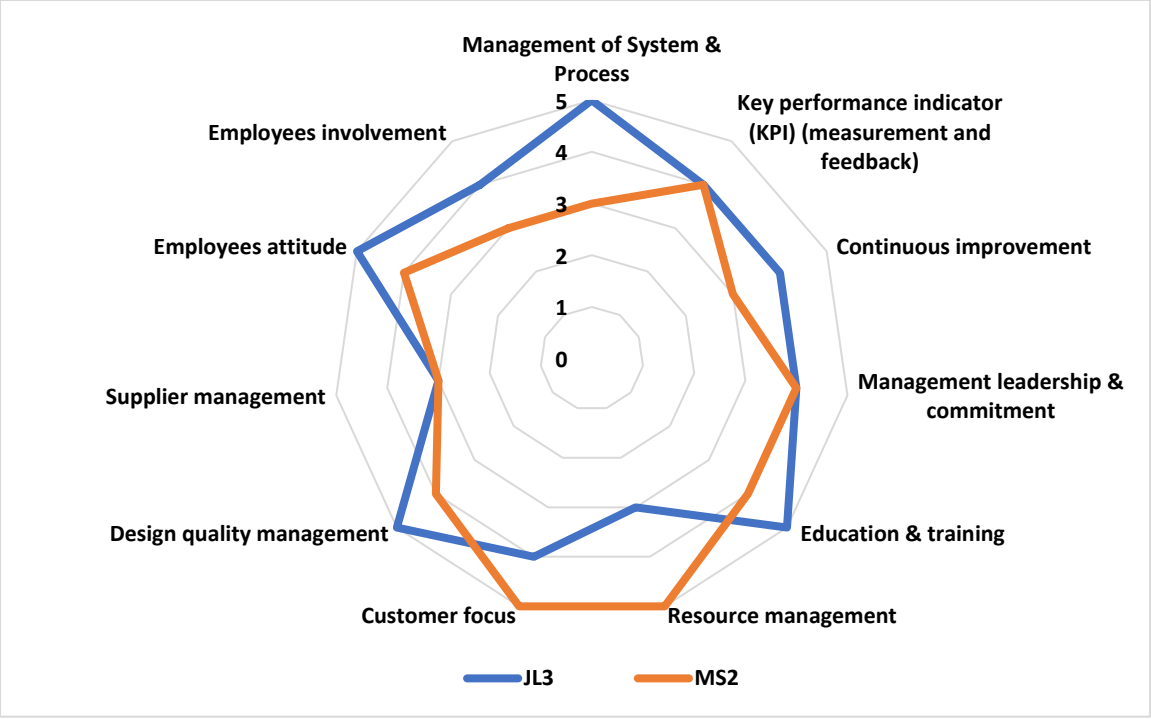


Note. Analyzed by the author.

Figure 6.8 shows the QI implementation level comparison between companies in the chemical sector. Since JL3 is a big multinational company, it is expected that they had a proper system and higher level of implementation. However, MS2 showed a higher level of implementation on resource management and customer focus. MS2 utilized various database and analysis software. Besides, MS2 even had a system to capture customers' requests, which was evident by looking at the number of requests they received every month. In contrast with MS2, JL3 still implemented manual document control and did not utilize any database with the reason to protect product confidentiality.

From the analysis, it can be concluded that coercive pressures imposed by customers did influence the QI implementation level, whereby companies gauge the customers' requirements to perceive the expected QI implementation level. Besides, different sectors have different levels of expectation for the QI implementation even if the companies are manufacturing similar products. As for normative pressure, it is evident that experienced employees, consultants, and training providers do help Malaysian companies to improve the level of QIs implementation.

Figure 6. 8. *QIs Implementation Level Comparison Between Companies in Chemical Sector*



Note. Analyzed by the author.

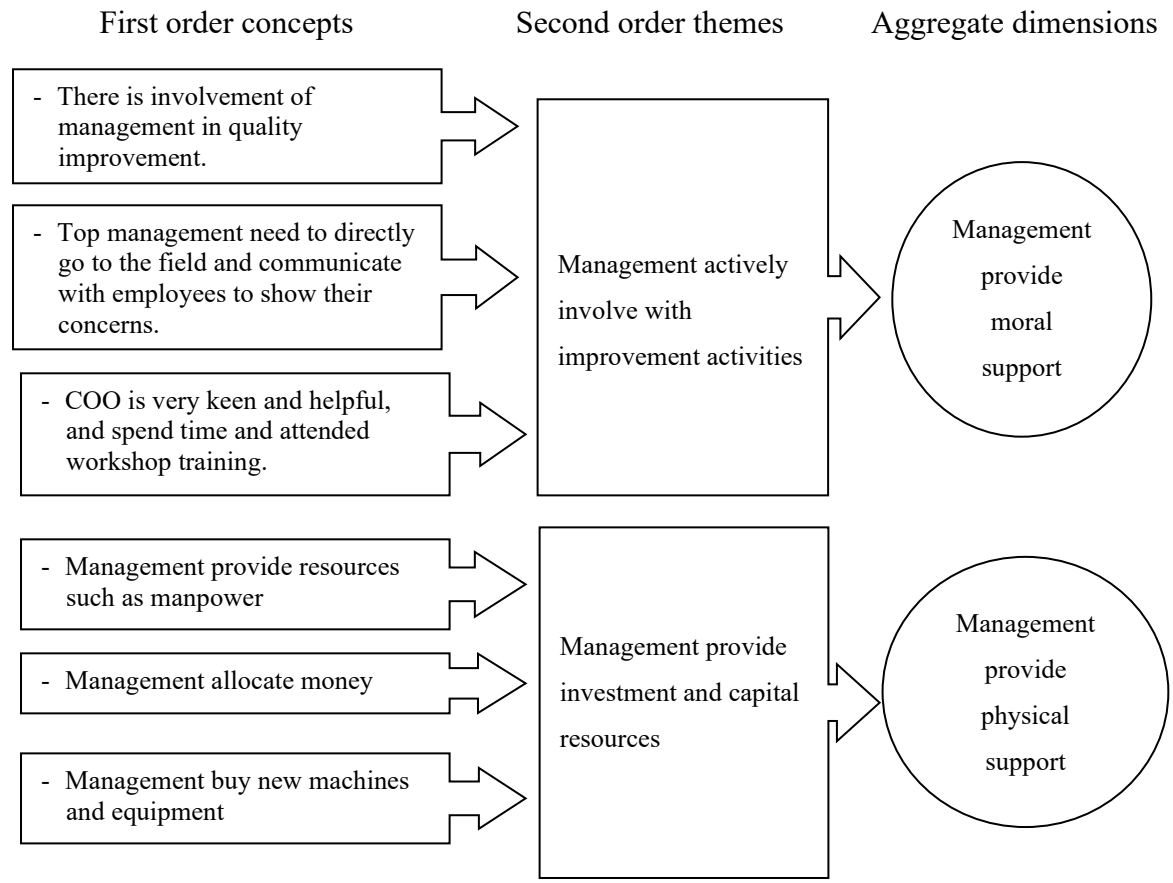
6.6 Important Factors that Contribute to the Success of the QIs implementation

Reay and Jones (2016) identified three techniques for studying logics: pattern deducing, pattern matching, and pattern inducing. Since the research was based on the inductive approach, the data were analyzed based on the bottom-up, inductive approach. From the codes identified, they were grouped into emerging categories to induce patterns. The analysis adopted Gioia et al.'s (2013) method, which included first order concepts, second order themes, and aggregate dimension.

Appendix V summarizes the important factors highlighted by the manufacturing companies. From the ATLAS.ti coding analysis, the factors were categorized into seven categories; management commitment, quality awareness minded, proper system and methods, provide resources and budget allocation, good teamwork and communication, competent and knowledgeable employees, and proper training. The grouping was then visualized by utilizing Corley and Gioia's (2004) diagram.

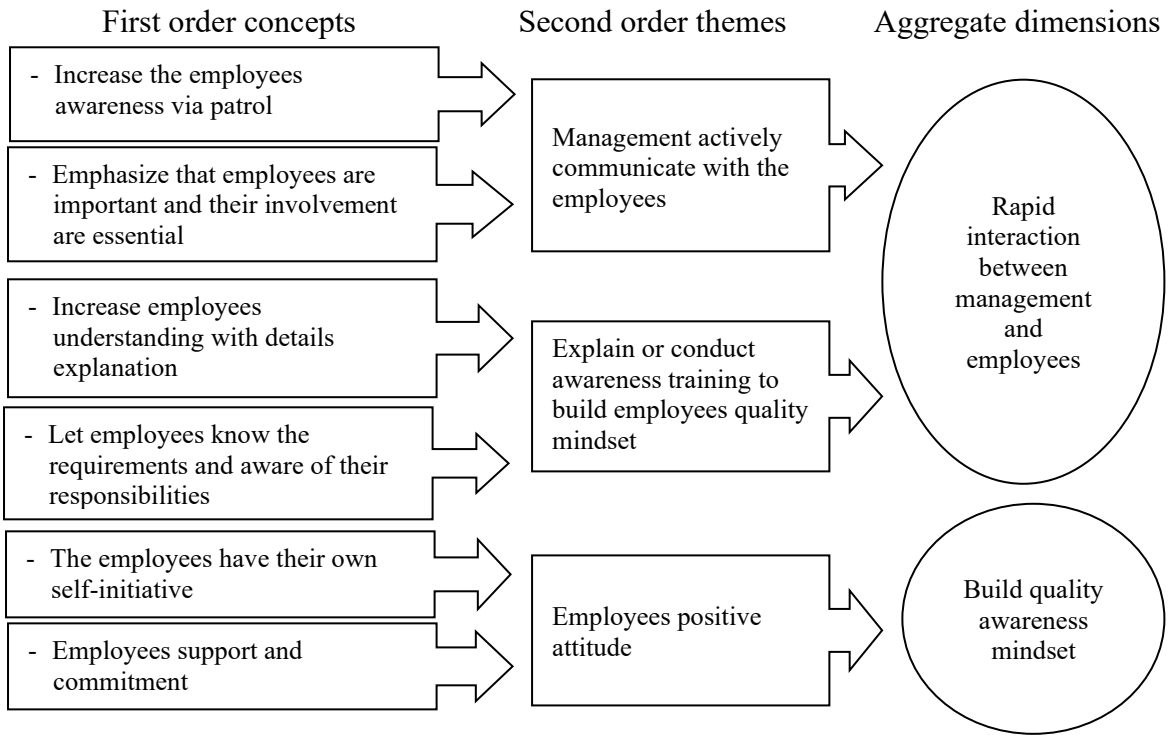
Based on the diagram, it was found that moral and physical support from management are essential (Figure 6.9). Furthermore, a rapid interaction between the management and employees, and built quality awareness mindset are among the practices that can improve employees' quality mindset (Figure 6.10). With regards for a proper system, the corrective and preventive actions system and dedicated PIC/committees to oversee the CI activities is a must to ensure the reproducibility and sustainability of the CI activities (Figure 6.11). As for resources and budget allocation (Figure 6.12), besides the physical support, management should provide competence employees as well to drive the QIs implementation. Competence employees may be possible by hiring some new employees or managers that possessing diversified skills and experiences (Figure 6.13). However, the management may as well provide relevant training to improve the hard skills (e.g., OJT and mentoring) and soft skills of the current hired employees (Figure 6.14). In addition to that, good teamwork and communication is essential. Management should build the teamwork spirit by providing proper platform for cross-function discussion and meeting (Figure 6.15).

Figure 6. 9. *Important Factors - Management Leadership and Commitment.*



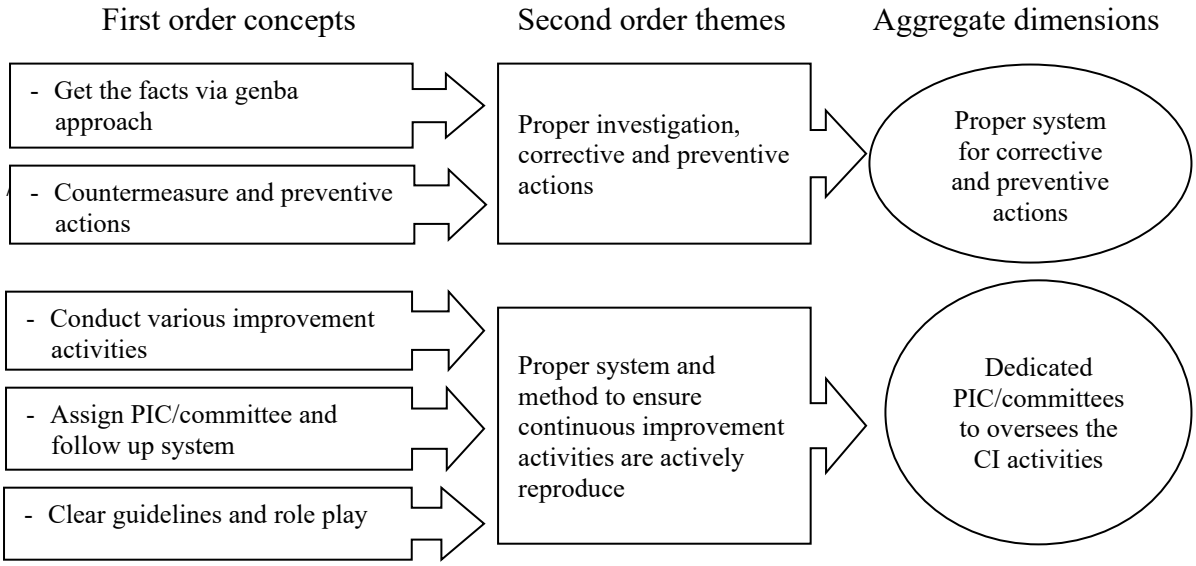
Note. Analyzed by the author.

Figure 6. 10. Important Factors – Quality Awareness Mindset



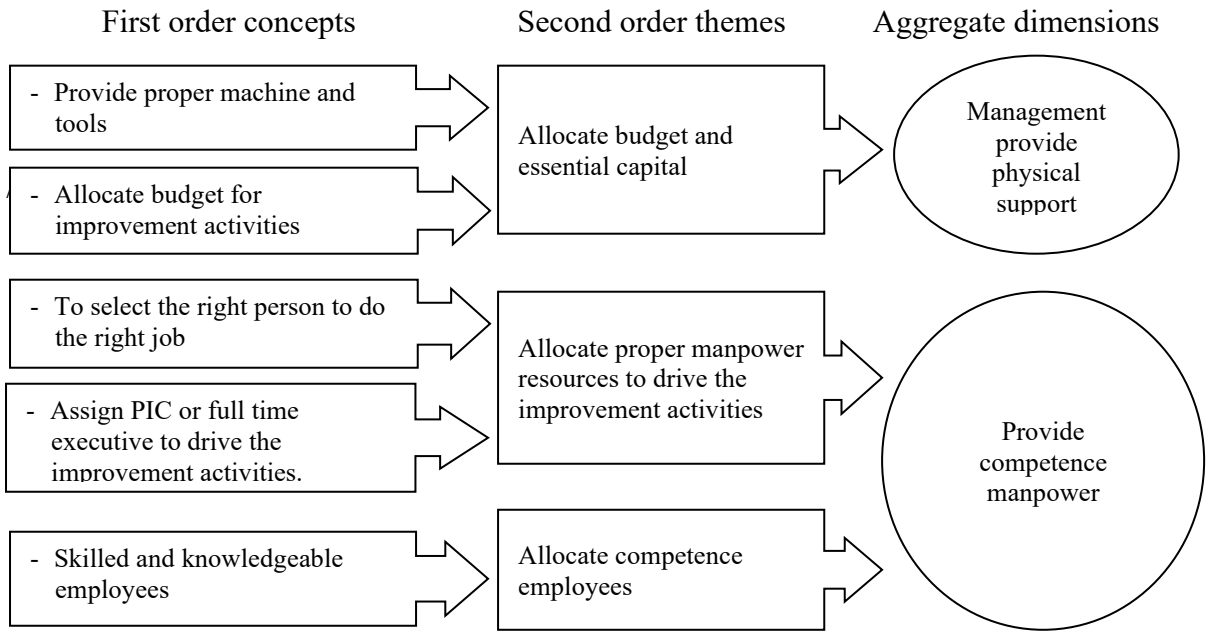
Note. Analyzed by the author.

Figure 6. 11. Important Factors – Proper System and Method



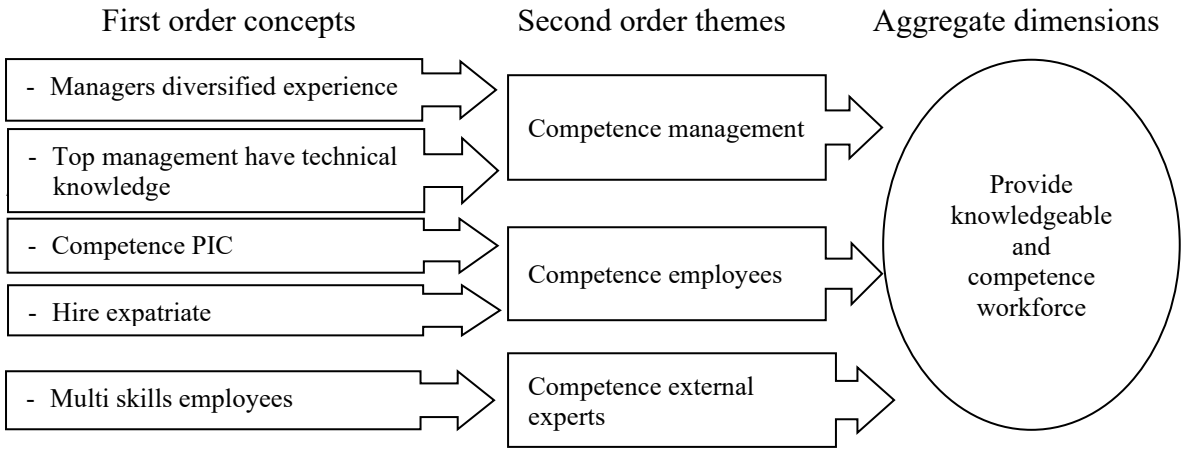
Note. Analyzed by the author.

Figure 6. 12. *Important factors – Provide Resources and Budget Allocation*



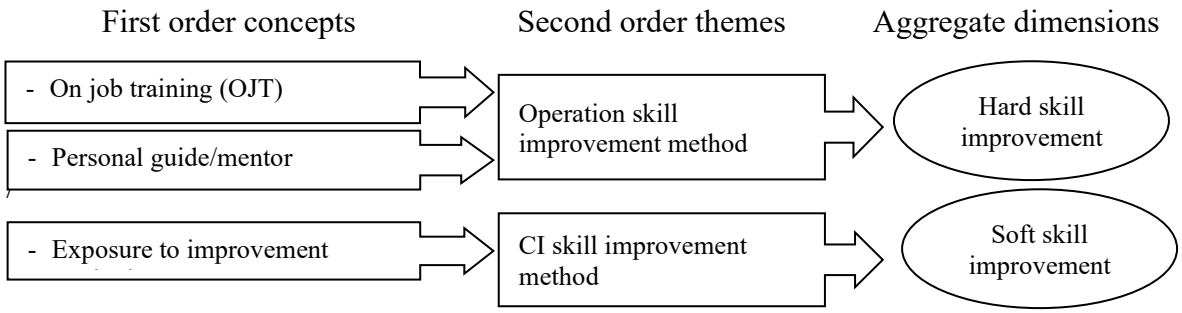
Note. Analyzed by the author.

Figure 6. 13. *Important Factors – Competence and Knowledgeable Employees*



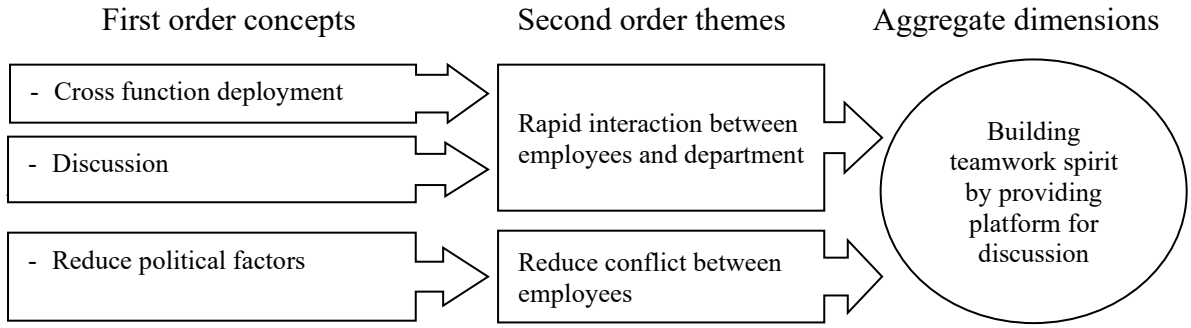
Note. Analyzed by the author.

Figure 6. 14. *Important factors – Training*



Note. Analyzed by the author.

Figure 6. 15. *Important factors – Good teamwork and communication*



Note. Analyzed by the author.

From the case studies conducted, there were four disruptive or failure factors that contributed to the declining of QIs implementation. Firstly, it was evident that lack of top management commitment was a big disruptive factor in the declining of QI practices in MM2. Secondly, it was found that assigning a full-time executive or coordinator played an important role as well. The findings were supported by the facts that the progress of QI implementation halted and declined after the PIC resigned. Thirdly, there was no formal structure, routine-reproduce or rule system to ensure that activities were continuously implemented, hence become sustainable. It is strongly recommended for companies to assign a dedicated committee to ensure that the implementation is intact even if the PIC resigns. The established committee would automatically ensure that the role of the resigned PIC will be automatically recovered by other committee's member as per JL1, JL3, and JM1 practices. Japanese manufacturing companies allow certain degree of autonomy, the power to decide, the power to spend the budget and make decision by certain group. Thus, the QI activities can be autonomously

conducted and continuous. Fourthly, the employees were quite busy with their own job scope and tasks and had really tight schedule to squeeze in the QIs activities. Thus, they had a difficulty to balance both activities and did not have ample time to sit and quietly think the best method and options for the quality improvement. Manufacturing industry working nature are always associated with tight schedule and excessive workload. Therefore, it will be interesting to study in depth the causes and countermeasures in future.

6.7 Reasons for Convergence and Divergence Practices

Table 6.2 summarizes reasons for convergence and divergence practices of the ten QIs implementation elements. There were four reasons identified which contributed to the convergence of the practices. First, it was found that most of the convergence practices were due to meeting the basic requirements of ISO 9001. This was expected since most of the ISO 9001 management system practices were derived from TQM practices. Second, besides ISO 9001 requirements, HRDF system established by the Government help to leverage the companies education and training level, hence act as a mediate to catalyze the development of competence employees in Malaysia. The fund ensures companies to invest a certain amount for employees education. Therefore, this encourages companies to educate the employees via training providers and consultants.

Third, supplier's performance were closely monitored through the supplier audit to ensure suppliers were meeting the desired QI implementation level. Therefore, customers' audit and supplier management system enable a rapid interaction between companies, and thus increased the possibilities of benchmarking and mimicking each other (mimetic pressures). Fourth, it was found that companies still have a little bit difficulty to cultivate positive employees' attitude from different departments beside QA. Some of the employees were less motivated to co-operate with the management in following the ISO 9001 requirements due to a few reasons such as they were busy and had tight schedule, less sense of responsibility, and the activities were not driven by top management.

Table 6. 2. *Reasons for Convergence and Divergence Practices*

No	Elements / Factors	Convergence	Reasons	Divergence	Reasons
1	Management of System & Process	More structured and organized after implemented ISO 9001.	Basic requirements of ISO 9001,	Most of the Japanese companies have dedicated committees/PICs to monitor the QIs activities.	Established a formal structure to ensure activities smoothly running continuously (routine-reproduce).
				Companies not certified with certain standards (e.g. IATF and API) even produced similar products.	QIs implemented depend on supplied sector.
2	Key performance indicator (KPI)	Japanese and Malaysian manufacturing companies management have fully utilized the ISO 9001 system in setting-up and meeting-up with KPI objectives.	Basic requirements of ISO 9001.		
3	Continuous improvement	All companies have at least few improvement activities at management level.	Basic requirements of ISO 9001.	Improvement activities quite inactive in JS1 and MM2 due to resignation of PIC.	No proper system to ensure the activities are continuously conducted, especially if the PIC resigned.
4	Management leadership & commitment	Top management provides necessary physical support.	Basic requirements of ISO 9001.	Japanese companies generally provide higher moral support. Top management actively involved in the QIs activities and companies offer a reward scheme for appreciation.	The Japanese manufacturing companies have no doubt in the power of Kaizen in improving manufacturing processes and product quality.
5	Education & training	Companies educate the employees via training providers and consultants.	HRDF acts as a mediator to catalyze the development of employees' competency in Malaysia.	Large Japanese companies have dedicated training center/system.	Source of knowledge are different: Japanese companies – Experts from HQ and designated internal trainers. Malaysian companies - experienced employees.
				Some of Malaysian companies utilize experience managers/engineers to train employees.	

Note. Summarized by the author.

Table 6. 2. *Reasons for Convergence and Divergence Practices (Continued)*

No	Elements / Factors	Convergence	Reasons	Divergence	Reasons
6	Resource management			JL1 and MS2 utilized various database	Product traceability, quality control and to capture customers' requirements.
7	Customer focus	Customer's satisfaction survey is conducted to capture customers' requirements and satisfaction level.	Basic requirements for ISO 9001.		
8	Design quality management			MM3 and JM1 demonstrated loose control on design quality management.	Products manufactured are not complex, low risks, and they are located at the upstream of supply chain.
9	Supplier management	Supplier's performances are closely monitored through supplier audit.	To ensure suppliers are meeting desired QI implementation level. Basic requirements of ISO 9001.	JM2 implemented a collaborative relationship (engineers will visit suppliers and help suppliers to resolve the problems).	Produces precision parts with material quality (e.g., casting part) substantially relying on suppliers' product quality.
10	Work environment and culture-employees attitude	Employees from different departments were less motivated to co-operate with the management in following the ISO 9001 requirements.	Employees were quite busy and had tight schedule. Low sense of responsibility. The activities were not driven by the top management.		
	Work environment and culture - employees involvement			Some companies have limited involvement level.	Foreign workers, high turnover rate and no improvement activities at group and individual level.

Note. Summarized by the author.

As for the divergence practices, seven reasons that contributed to the divergence practices were identified. First, in terms of management of system and process, most of the Japanese companies established a formal structure, such as assigned dedicated committees to ensure routine-reproduce. Besides, it was found that the companies did not certify with certain standard (e.g., IATF and API), even producing similar products because the decision to implement certain QIs depends on the supplied customers' sector. Second, as for continuous improvement activities, it was found that the activities were inactive in two companies due to the loss of QIs entrepreneurs or custodians. The companies did not have a proper system to ensure the activities were continuously conducted even the after the PIC had resigned.

Third, in terms of management leadership and commitment. The QIs activities were integrated in the Japanese companies management system as a basic principle and policy. The QIs practices become a norm for the Japanese companies since the companies continued to implement the QIs activities for quite a long time. It can be concluded that the Japanese manufacturing companies had strong beliefs on the QI effectiveness and benefits. This was supported by the fact that the top management of Japanese companies in general provided higher physical and moral support as compared to Malaysian companies. The top management of Japanese companies were actively involved in the QIs activities and demonstrated their commitment company-wide by emphasizing the importance of QIs activities during meetings and offered some reward scheme for appreciation.

Fourth was related to education and training system. It was found that large Japanese companies went the extra mile in establishing a dedicated training center or system which consist of internal trainers and standard syllabus. Most of the internal trainers were trained by experts from Japan and most of the syllabus were from headquarters. Malaysian companies have different sources of knowledge, whereby the companies mainly relied on their experience employees or training providers.

Fifth, there was no big differences found in practices between the Japanese and Malaysian manufacturing companies in terms of design quality management. However, it was found that the design quality management practices were depending on the nature of customers' business, products complexity, level of risk and position in the supply chain (e.g., upstream or downstream). A higher level of design quality management was expected if the product was having a higher complexity and level of risk.

Sixth was related to supplier management. It was found that only JM2 implemented a collaborative relationship, whereby the engineers would visit and help the suppliers to resolve their problems. JM2 was producing precision parts with material quality (e.g., casting part) and substantially relying on their suppliers' product quality. Therefore, JM2 had monitored closely their suppliers' performance. However, the decision to implement collaborative relationship was influenced by the assistant general manager that was responsible for production engineering and QA/QC section. Seventh, in terms of employee's involvement. Some companies have limited employees' involvement level. This were due to foreign workers having limited capability, high turnover rate and no improvement activities were designed at group and individual level. Therefore, this impeded the involvement level company-wide.

6.8 Degree of Institutionalization

Table 6.3 listed the five bases evaluation criteria for QIs institutionalization level. In regard to nominal indicators and visualization, five points indicated "highly visible" evidence to support the base, while three points is considered as "moderately visible" evidence. However, one point was assigned if there was not enough evidence to support the base. Table 6.4 and Table 6.5 summarize the five bases of endogenous and exogenous resources that are essential for QI institutionalization to persist (Zeitz et al., 1999) and shall be utilized to gauge the degree of institutionalization.

Based on Figure 6.16, it was found that Japanese manufacturing companies generally had a higher degree of institutionalization. Five out of six Japanese manufacturing companies obtained average higher than 3.0 points. As for Malaysian manufacturing companies, only one out of eight companies obtained average higher than 3.0 points. The research findings aligned with Meyer and Rowan's (1977) proposition "as rationalized institutional rules arise in given domains of work activity, formal organizations form and expand by incorporating these rules as structural elements". It is evident that manufacturing companies with a higher degree of institutionalization have dedicated committees and PIC with higher levels of regulative and technical-rational bases.

Table 6. 3. *Five Bases Evaluation for QIs Institutionalization Level*

Basis	Definition (Zeitz et al., 1999)	Low (1)	Moderate (3)	High (5)
Models	Imitation by one actor of perceived practices displayed by others	There was insufficient evidence	"Moderately visible" evidence	"Highly visible" evidence
Culture	The existence of values and beliefs that are matched by important cognitive and normative propensities of actors	There was insufficient evidence	"Moderately visible" evidence	"Highly visible" evidence
Education	The transmission of beliefs, values and technical information by specific means, including trained instructors, a body of knowledge, instructional materials, and a site for activity	There was insufficient evidence	"Moderately visible" evidence	"Highly visible" evidence
Regulative	Constraint applied by one actor on another, either positive or negative, and consisting of legal sanctions or withholding important resources	There was insufficient evidence	"Moderately visible" evidence	"Highly visible" evidence
Technical	Specific efforts to measure and evaluate responsiveness to a need or contribution to performance (rewards for efficiency)	There was insufficient evidence	"Moderately visible" evidence	"Highly visible" evidence

Note. Adapted from Zeitz et al. (1999)

Table 6. 4. *Five Bases Evaluation for Japanese Manufacturing Companies*

Bases Company	Models (Mimetic pressure)	Culture	Education (Normative pressure)	Regulative (Coercive pressure)	Technical-rational (Benefits)	Average
JL1	Benchmarking HQ and other JL1 group improvement and best practices (Southeast Asia Kaizen activities)	The staffs continued the culture. Sometimes it was difficult to get participation. JL1 gave monetary and rewards to encourage participation.	Established JL1 cultivation system to educate employees. Special instructors were nominated to train on related topics, such as 7QC tools, design review, etc.	Most of the QIs implemented were from the HQ direction. Conducted various activities (IPAG, task force, GATE, Kaizen). Established committees and conducted regular meetings and follow up.	JL1 believed they gained benefits from the improvement programs. The best projects award-GATE competition winner will represent JL1 for Southeast Asia and global group competition in Japan.	4.80
Points	5	4	5	5	5	
JL2	Benchmarking other JL2 group improvements via factory managers meeting conducted in every 4 months.	Hired foreign operators. Might have difficulties to sustain the culture.	No special training system or internal trainer nomination. Employees learn while doing the improvement activities.	Implementation was due to JL2 policy. QCC was conducted on a yearly basis within 4 months as per schedule.	Able to reduce rejection and maximize profits. The best improvement will represent JL2 for a yearly competition among group in Japan	3.40
Points	5	1	1	5	5	
JL3	A yearly conference among plants in Malaysia and a yearly presentation at HQ.	Kaizen is like a sideline improvement activity. JL3 emphasized more on ISO implementation since it has a clear target.	Established JL3 Malaysia Group Training Center to train various topics, such as soft skills training, ISO training, etc.	Followed HQ principal policy. Established committees to coordinate the Kaizen (QCC) improvement functions. Assigned a PIC from every department.	A proper system and able to ensure the quality of products. Gave small tokens of rewards.	4.60
Points	5	3	5	5	5	

Note. Analyzed by the author.

Table 6.4. *Five Bases Evaluation for Japanese Manufacturing Companies (Continued)*

Bases / Company	Models (Mimetic pressure)	Culture	Education (Normative pressure)	Regulative (Coercive pressure)	Technical-rational (Benefits)	Average
JM1	No evidence for benchmarking and frequent knowledge-sharing practices	The QIs became JM1 culture since it has been implemented for a long time.	Nominated internal trainers to train on related modules.	Guidelines from HQ. Implemented QIA and Gemba Kaizen (SGA). Established committees to coordinate and conduct mentoring in rotation.	JM1 gained lots of benefits from the QIs activities. Award given for Gemba Kaizen.	4.20
Points	1	5	5	5	5	
JM2	JM2 will follow Japan and attempt to standardize.	Employees were aware that Kaizen meant that they need to conduct some improvement.	No special training system or internal trainer nomination.	Originated from HQ. HQ provided related resources to ensure the success of implementation, such as assign FM from Japan. Implemented Kaizen, QRQC and ABC Chart (customer claim monitoring). No specific organization chart for Kaizen.	Gained benefits in terms of documentation. As for rejection rate, the improvements were there but with moderate impact due to capability of old machines. Award was given for 5S activities.	3.60
Points	5	3	1	5	4	
JS1	No evidence for benchmarking and frequent knowledge sharing practices.	There was less evidence showing that QIs are becoming a culture. Employees skipped some documentation processes.	No special training system or internal trainer nomination.	HQ will conduct audit on a yearly basis and request for some improvements. Implemented Kaizen on ad-hoc basis. There was no formal organization. There were few improvement activities conducted since the assigned PICs had resigned.	More business opportunities and cost were down. Gained benefits from the improvement. There was no award/reward given.	1.80
Points	1	1	1	3	3	

Note. Analyzed by the author.

Table 6. 5. *Five Bases Evaluation for Malaysian Manufacturing Companies*

Bases Company	Models (Mimetic pressure)	Culture	Education (Normative pressure)	Regulative (Coercive pressure)	Technical-rational (Benefits)	Average
ML1	No evidence for benchmarking.	Prioritized speed over quality since 95% of products was for retail industry. Manpower turnover rate was high. Difficult to maintain the culture. Besides, there was no frequent briefing or meeting because ML1 believed it was not necessary.	No special training system or internal trainer nomination.	Performance update was not frequent. Just twice a year.	Believed that there were some benefits in implementing ISO. However, ML1 perceived fewer benefits gained from the implementation.	1.0
Points	1	1	1	1	1	
ML2	No evidence for benchmarking.	Actively implemented the SGA and ESS. Implemented SGA for 20 years. Fine-tuned the improvement activities to achieve a big impact from the implementation. The culture seemed to be entrenched for SGA. Six Sigma implementation is currently inactive due to no request from customers.	No special training system. However, ML2 nominated an internal trainer for SGA training.	Quality objectives were monitored via daily and operation meeting. Established the CIP groups to tackle arising issues. Established ESS for employees to channel their improvement ideas. Implemented Six Sigma due to customer's requests.	Changed focus on cost saving instead of various improvement area due to a tight competition. Gained recognition and legitimacy. Gave reward if SGA group managed to get the improvement target.	3.60
Points	1	4	3	5	5	

Note. Analyzed by the author.

Table 6.5. *Five Bases Evaluation for Malaysian Manufacturing Companies (Continued)*

Bases Company	Models (Mimetic pressure)	Culture	Education (Normative pressure)	Regulative (Coercive pressure)	Technical-rational (Benefits)	Average
MM1	Knowledge sharing by managers with diversified background. Tried to implement the QIs based on previous working experience.	Internal training was conducted to increase employees' awareness on Kaizen and Lean.	No special training system, but there is an internal trainer.	Most of MM1 customers were from Japanese companies. MM1 have to obligate to Japanese culture and strictly follow their requirements and system. There was no coercive pressure for Lean implementation. MM1 did not impose any rules for Lean implementation internally.	Improved product quality. No reward was given for the improvement, but reward was given for the best employee.	3.00
Points	5	3	3	1	3	
MM2	Knowledge sharing by manager and coordinator. VPQHSE had a diversified background. Tried to implement the QIs based on previous working experience.	Unable to embed the culture successfully. Management changed focus and employees were busy and had lots of tasks.	No special training system. However, there is an internal trainer.	Conducted many improvements based on Six Sigma, while Kaizen and Lean were based on the established system. The QIs activity stopped temporarily since the coordinator had resigned.	Gained benefits such as cost- saving and knowledge. No reward was given for the improvement conducted.	3.00
Points	5	1	3	3	3	
MM3	QA manager studied and came across Kaizen concepts.	Hired foreign operators. Have difficulties to maintain the culture because of high manpower turnover.	No special training system or internal trainer nomination.	Implemented Kaizen or QCC based on the QA manager's decision. Improvement monitored and recorded accordingly.	Able to improve quality. No reward was given for the improvement conducted.	2.20
Points	3	1	1	3	3	

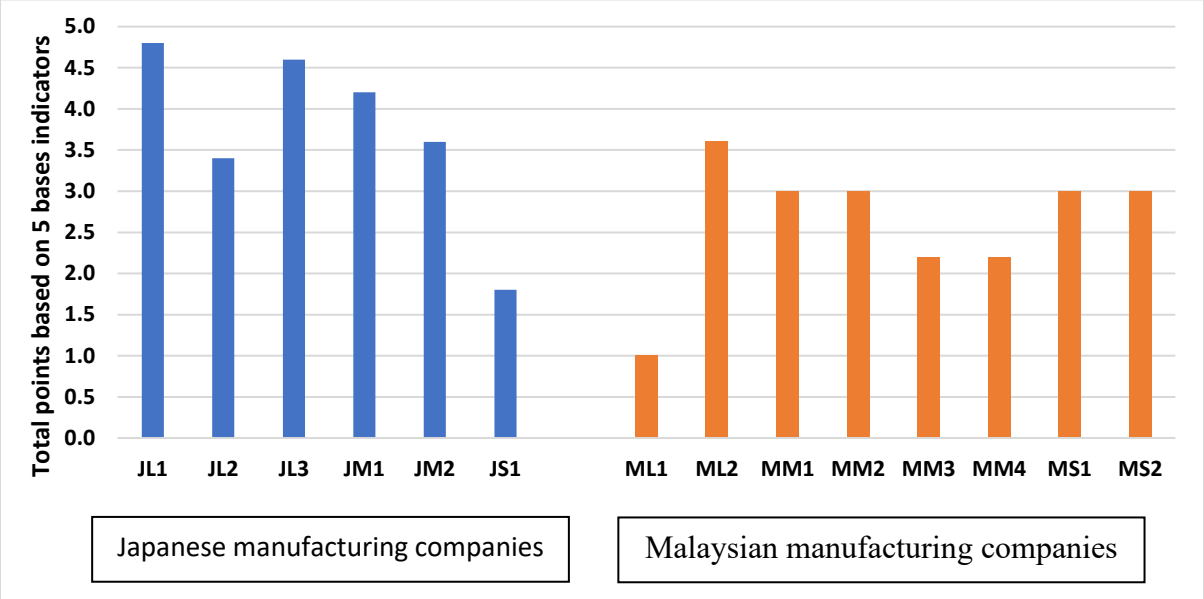
Note. Analyzed by the author.

Table 6.5. *Five Bases Evaluation for Malaysian Manufacturing Companies (Continued)*

Bases / Company	Models (Mimetic pressure)	Culture	Education (Normative pressure)	Regulative (Coercive pressure)	Technical-rational (Benefits)	Total points
MM4	Paperless system improvement was conducted by ED since the ED has an IT background.	CI team members have difficulties to conduct improvement due to the time constraint.	No special training system or internal trainer nomination.	Nominated CI team members to conduct improvement.	Received more business and gained customers' confidence.	2.20
Points	3	1	1	3	3	
MS1	MPC promoted the Lean implementation and gave consultation to MS1 for one year.	Difficult to implement Lean due to the nature of production (batch type).	No special training system or internal trainer nomination.	MD requested for HOD to have an improvement team from various departments for Lean improvement projects on a yearly basis. The project will be presented to the BOD.	MS1 seemed to be struggling to get the benefits from the implementation. Gave award for the best project.	3.00
Points	5	1	1	5	3	
MS2	There was no evidence for benchmarking.	Top management demonstrated a good work culture for improvement activities.	No special training system or internal trainer nomination.	Conducted improvement based on ISO requirements. MS2 actively captured feedback from customers and properly recorded for further improvement.	No reward was given for the improvement but provided various benefits and activities to increase employee motivation.	3.00
Points	1	5	1	5	3	

Note. Analyzed by the author.

Figure 6. 16. *Degree of institutionalization for both Japanese and Malaysian manufacturing companies*



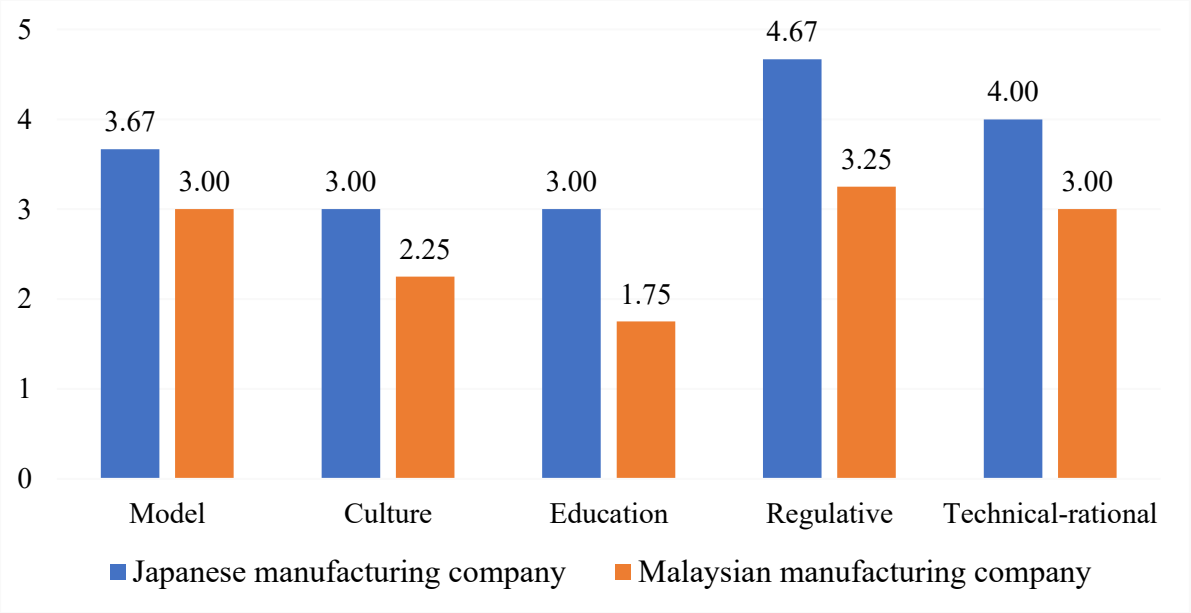
Note. Analyzed by the author.

From the five bases depicted in Figure 6.17, it is obvious that the Japanese manufacturing companies emphasized regulative and technical-rational bases to promote and sustain the implementation. However, some Japanese companies attained the extra mile in strengthening the benchmarking (mimetic pressure) and education (normative pressure) bases with frequent information sharing and a special education system. As evidence, some of the Japanese companies (JL1, JL2 and JL3) conducted periodical meetings and discussions between their business partners. They even held competitions between groups to stimulate horizontal deployment and benchmarking practices. This finding was in line with DiMaggio and Powell (1983) and Zeitz et al.'s (1999) mimetic pressure point of view, whereby companies are most likely to benchmark and imitate the main competitors and counterpart experience.

As for culture-based, Japanese and Malaysian manufacturing companies had some difficulties to retain their culture due to time constraint and higher manpower turnover. However, Japanese companies had slight advantages due to longer years of implementation, top management full commitment, dedicated committees, frequent monitoring, and awareness training. From the findings, it is evident that most Japanese manufacturing companies, except for JS1, had a tight coupling between the management system and QIs due to the companywide internalization process. These findings supported the view about tight coupling; hence, QI

institutionalization would be successfully guaranteed if the internalization precedes standardization (Sandholtz, 2012).

Figure 6. 17. Degree of Institutionalization Based on 5 Bases



Note. Analyzed by the author.

Conversely, ML2 demonstrated decoupling activities for the Six Sigma program because ML2 executed the Six Sigma projects due to customer request. The Six Sigma program became inactive once there was no customer request. Besides, since ML2 implemented the SGA activities, the Six Sigma program was viewed as a redundant program because both SGA and Six Sigma group activities serve the same purpose, which is to resolve problems via cross-functional approach. Therefore, ML2 adopted the decoupling strategies to which it is implemented as and when required by customers. This is in line with Meyer and Rowan's (1977) proposal that organizations decouple their practices from their formal or espoused structure to solve these two problems of institutional pressures; first, the rationalized myths may not compromise an efficient solution for the organization (contradictions with internal organizational efficiency), and second, competing and internally inconsistent rational myths can exist simultaneously (contradictions among multiple institutionalized pressures) (Greenwood et al., 2008, p.81). This finding supported the decoupling theory views by Buysse and Verbeke (2003), Delmas and Montes-Sancho (2010) as well as Bhakoo and Choi (2013).

It was observed that JS1 and MM2 were in danger of declining QI institutionalization practices due to the resignation of QI institutional entrepreneurs, typically known as assigned PIC or coordinator. Therefore, this finding was parallel with Gonzalez's (2011) findings, which were among the reasons that TQM has failed to immigrate from a Spanish electrical company to the acquired firm. This was due to the loss of custodians or TQM entrepreneurs.

Based on the interview outcomes, several justifications are anticipated could be disclosed with regard to the moderate and low degrees of institutionalization. First, most of the improvement programs were not integrated within the system due to ad hoc basis work culture. Second, there was a lack of formal structure and no designated PIC to monitor and oversee the quality improvement programs. Third, the improvement programs were not successfully embedded into the company culture.

"We do not conduct frequent meetings, talks or give rewards. For us, it is just nonsense. That's why we do not implement it," quoted by the Quality Manager of Company ML1.

Fourth, the main driving force were external party-driven, which required various requirements. Thus, the QI implementations were conducted mainly due to legitimacy.

"If requested by customer, then management will invest. As for QCC, all of the industries will gather during the QCC convocation. They will observe our presentation on how we conduct the improvement. It is something like marketing to promote our company," quoted by the Quality Manager of Company ML2.

Fifth, there was a lack of employees' knowledge/ experience with regard to QIs.

"MM5 - We want to conduct the improvement. But sometimes we lack ideas especially in technical knowledge," quoted by the Quality Manager of Company MM3.

However, almost all the Japanese manufacturing companies except JS1 were considered to have a high degree of institutionalization since the companies generally had a formal structure, routine-reproduced and program or rule systems company-wide, which are aligned with the Japanese work culture.

"For the GATE activity, it has been spread all over JL1. When I joined JL1, the activity was already there. The staff just continue the culture," quoted by the Quality Manager of Company JL1.

"As for Genba Kaizen, it is like JM1's culture, as it has already been implemented for such a long time," quoted by the Quality Manager of Company JM1.

6.9 Correlation Analysis

Correlation analysis was conducted to pre-identify possible correlation between the studied five bases of QIs institutionalization resources, QIs elements, capital, and profit. Since the sample size (14 case study companies) is considered quite small and the data consist of ordinal data, the Spearman correlation with 95% of confidence level was considered appropriate for this analysis. The correlation coefficient results will be based on Table 6.5 interpretation guidance. However, these correlation coefficient results serve as preliminary possible identification and is not totally absolute due to the small sample size limitation. Table 6.6 shows the correlation coefficient analysis results generated from Minitab 21.1 version. It was found that a few bases and elements were having positive correlation between each other. Correlation value between technical-rational base and employees involvement elements (as highlighted in green) was 0.925 demonstrated that there is a very high positive correlation between these two factors. The correlation is possible when considering the facts that the more the employees are exposed to the QIs activities, the more the employees technical-rational may positively increase or vice versa.

Table 6. 6. *Rules of Thumb about Correlation Coefficient*

Coefficient Range	Strength of Association
± 0.91 to ± 1.00	Very strong
± 0.71 to ± 0.90	High
± 0.41 to ± 0.70	Moderate
± 0.21 to ± 0.40	Small but definite relationship
± 0.00 to ± 0.20	Slight, almost negligible

Note. From Money et al. (2007) as cited in (Sellar & Arulrajah, 2019)

Table 6. 7. *Correlation Coefficient Analysis Result*

	Capital	Profit	Models	Culture	Education	Regulative
Profit	0.310					
Models	0.043	0.041				
Culture	0.160	0.093	-0.170			
Education	0.404	0.372	0.189	0.611		
Regulative	0.489	-0.148	0.260	0.274	0.058	
Technical-rational	0.644	0.036	0.262	0.574	0.664	0.512
Management of System & Process	0.544	0.103	0.261	0.468	0.640	0.348
KPI	0.146	0.350	-0.109	-0.012	0.259	-0.465
CI	0.622	0.233	0.237	0.428	0.370	0.364
Management Leadership & Commitment	-0.062	0.060	0.192	0.257	-0.039	0.345
Education & Training	0.101	0.448	0.399	0.465	0.613	0.114
Resource Management	0.140	0.257	-0.082	0.747	0.250	0.306
Customer Focus	0.333	0.274	0.309	0.460	0.105	0.609
Design Quality Management	0.191	0.410	0.341	0.724	0.653	0.187
Supplier Management	-0.113	-0.113	0.158	0.362	0.144	0.227
Employees Attitude	0.252	0.576	-0.056	0.598	0.417	-0.094
Employees Involvement	0.430	0.066	0.343	0.666	0.715	0.462

	Technical-rational	Management of System & Process	KPI	CI	Management Leadership & Commitment
Profit					
Models					
Culture					
Education					
Regulative					
Technical-rational					
Management of System & Process	0.788				
KPI	-0.023	0.191			
CI	0.665	0.539	0.068		
Management Leadership & Commitment	0.094	0.043	0.137	0.044	
Education & Training	0.405	0.191	-0.194	0.233	0.129
Resource Management	0.472	0.270	-0.018	0.378	0.613
Customer Focus	0.399	0.316	-0.104	0.663	0.348
Design Quality Management	0.648	0.471	-0.061	0.555	0.211
Supplier Management	-0.030	0.124	-0.054	-0.239	0.421
Employees Attitude	0.388	0.252	0.261	0.601	0.185
Employees Involvement	0.925	0.756	-0.011	0.629	0.188

	Education & Training	Resource Management	Customer Focus	Design Quality Management	Supplier Management	Employees Attitude
Profit						
Models						
Culture						
Education						
Regulative						
Technical-rational						
Mgmt of System & Process						
KPI						
CI						
Mgmt Leadership & Commitment						
Education & Training						
Resource Management	0.468					
Customer Focus	0.375	0.587				
Design Quality Mgmt	0.834	0.699	0.567			
Supplier Mgmt	0.164	0.225	0.083	0.180		
Employees Attitude	0.467	0.652	0.437	0.764	0.068	
Employees Involvement	0.560	0.541	0.515	0.756	-0.025	0.380

Note. Analyzed by the author.

6.10 QIs Dissemination in Malaysia

Table 6.7 summarizes the driving forces (internal and external motivation), while Table 6.8 summarizes the institutional pressures imposed that stimulate QI implementation. It is evidenced that the motivation, which stimulated the QIs implementation was from various sources; either individuals, organizations, or external environment. Most of the reasons that led to QI implementation were due to customers' requirements, social legitimacy, potential business, and the desire to improve product quality and productivity via proper management system and control. Customers' requirements were considered as the biggest factor that drives companies to implement related QIs.

Besides meeting customers' requirements and expectation, aiming to obtain social legitimacy was evident among the case study companies. In addition to that, companies that implemented the QIs were able to increase new potential business areas. It is a worldwide belief that QIs are able to improve product and process performance. Therefore, the quickest and reasonable way to improve companies' performance is by implementing related QIs. Furthermore, Kaizen activities (e.g., Poka Yoke) can be integrated in ISO 9001 to fulfill the requirements such as CI activities.

With regard to isomorphic institutional pressures, the top management and HQ applied coercive and mimetic pressures to the companies while expatriate and experienced PIC applied normative pressures to both local and foreign workers. Education and training practices received normative pressures especially from internal trainers. External trainers and government agencies applied normative pressures as well to the education practices during the interaction process. However, the density of pressures might not be as strong as the internal trainers since both government agencies and external trainers have less direct interaction and control on the companies. As for supplier management, the companies applied coercive pressures to suppliers for ISO implementation.

Since the implementation of other QI practices varied without a clear standard and certification process (e.g., ISO 9001, IATF 16949, and API Q1), companies were just able to apply normative pressure to the suppliers usually during the periodical audit. However, big companies were able to apply strong coercive pressures due to the market driven power that the big companies possessed. For example, IBM managed to apply coercive pressures to suppliers in pursuing the Six Sigma implementation in the case of ML2.

Table 6. 8. *Summary of Driving Forces*

Company	ISO 9001	Kaizen	Lean manufacturing	Six Sigma
JL1	Direction from HQ Initiated by employees	GATE -Mimec counterpart ad direction from HQ Kaizen – Initiated by employees	Direction from HQ and enforcement by MD	X
JL2	Requested by customers Initiated by employees	Quality Control Circle (QCC) and departmental Kaizen – HQ policy	X	X
JL3	Direction from HQ Requested by customers	Quality Control Circle (QCC) – Direction from HQ	X	X
JM1	Requested by customers Top management direction	Genba Kaizen (SGA) – Direction from HQ	X	X
JM2	Requested by customers Initiated by employees	Kaizen (QRQC and ad-hoc) - Direction from HQ ABC chart – Direction from MD based on peer persuasion	X	X
JS1	Requested by customers	X	X	X
ML1	Requested by customers	X	X	X
ML2	Requested by customers	SGA or QCC- Initiated by employees and encouraged by MPC	X	Requested by customers
MM1	Requested by customers	X	Initiated by employees	X
MM2	Requested by customers	Initiated by employees	Initiated by employees	Initiated by employees
MM3	Requested by customers		X	X
MM4	Requested by customers	SGA (CI team) Direction from management to improve quality	X	X
MS1	Requested by customers	X	Direction from MD to improve quality	X
MS2	Requested by customers Initiated by employees	X	X	X

Note. Summarized by the author.

Table 6. 9. *Summary of Driving Forces based on Institutional Pressures.*

Company	ISO 9001	Kaizen	Lean manufacturing	Six Sigma
JL1	Coercive and normative	GATE – Coercive and mimetic Kaizen – Normative.	Coercive	X
JL2	Coercive and normative	QCC and departmental Kaizen – Coercive and mimetic	X	X
JL3	Coercive	QCC – Coercive and mimetic	X	X
JM1	Coercive	Genba Kaizen (SGA) – Coercive and mimetic	X	X
JM2	Coercive and normative	Kaizen (QRQC and ad-hoc) – Coercive and mimetic ABC chart – Normative	X	X
ML1	Coercive	X	X	X
ML2	Coercive	SGA- Normative	X	Coercive
MM1	Coercive	X	Normative	X
MM2	Coercive	Normative	Normative	Normative
MM3	Coercive		X	X
MM4	Coercive	SGA (CI team) – Coercive and mimetic	X	X
MS1	Coercive	X	Coercive and mimetic	X
MS2	Coercive and normative	X	X	X

Note. Summarized by the author.

Besides, normative pressures was likely to occur for customers that practiced mentoring method to their respective suppliers. For example, in the case of MM4 whereby Panasonic actively guided MM4 in terms of quality improvement techniques and quality management of raw material foundry suppliers. Companies facilitated the physical resources in reaction to the normative and mimetic pressures. For example, JM2 and ML2 bought expensive and branded machines and equipment to show customers their capabilities and to gain employees' confidence in operating the machines and process as well.

Several key actors were discovered from case studies conducted at manufacturing companies and interviews/discussions conducted at government agencies, which influenced the QIs implementation dissemination in the Malaysian manufacturing industry, as discussed in Chapter 5. Table 6.9 represents actors for Japanese and Malaysian manufacturing companies that influenced QI implementation in Malaysia. Top management, education center/internal trainers, customer, and HQ were considered as primary actors, while employees' experience, multinational/large company, government agencies, and training providers are considered as secondary actors. Out of the eight actors, similarities existed between Japanese and Malaysian manufacturing companies, whereby top management, education center/internal trainers, and customer played a significant role to ensure the success of QI implementation. However, the Japanese manufacturing companies gained further benefit from HQ that strongly give support in various aspects such as quality and technical.

Table 6. 10. *Actors Influence QIs Implementation at Japanese and Malaysian Manufacturing Companies*

	Primary				Secondary			
	Top management	Education center/ internal trainers	Customer	HQ	Employees' experience	Multinational/ large company	Government Agencies	Training providers
Japanese manufacturing companies	◯	◯	◯	◯			◯	◯
	All	JL1 and JL3	All	All			JM2 (MIDA)	All
Malaysian manufacturing companies	◯	◯	◯		◯	◯	◯	◯
	All	ML2, MM1, and MM2	All		MM1 and MM2	MM4 (Panasonic) MS1 (Petronas)	MM1 (SIRIM), MM2 (SME), MS1 (MPC)	All

Note. Summarized by the author.

In terms of secondary actors, Japanese manufacturing companies hired external training providers to deliver vital and up-to-date training and course to enhance the employees' skills and competencies toward aligning with ever-changing customer demand in a globalized competitive market. Government support through MIDA as a recognized agency was detected to also influence one of Japanese manufacturing companies, JM2 which was exploring new aerospace market. With regard to Malaysian manufacturing companies, secondary actors (employees' experience, multinational/large company, government agencies, and training providers) were discovered to affect the implementation of QIs at respective Malaysian manufacturing companies. For example, MM1 strongly relied on employees' experience, government agency (SIRIM), and external training providers in order to enable the organization to perform several QIs efficiently and effectively. Furthermore, MPC and SIRIM are collaborating with experts from developed countries such as Japan, German and America. Thus, experts from developed countries indirectly contribute to the mimetic pressures through benchmarking activities conducted by government agencies. In addition, as highlighted by both Japanese and Malaysian companies, HRD Corp acts as a mediate to catalyze the development of employee competency in Malaysia. Companies need to contribute 1% of levy from the employees' monthly wages, which they need to use within a stipulated time. This encourages proper trainings to be conducted at Japanese and Malaysian manufacturing companies.

6.10.1 The Effects of Technology and Management Transfer from HQ in Japan to Japanese Companies in Malaysia

HQ has influence over the Japanese companies' QI implementation in Malaysia, whereby all the Japanese companies mentioned the role of HQ in their decision-making and management system. For example, most of the decisions made to implement the QIs were from HQ as summarized in Table 6.7. Besides, most of the Japanese companies implemented Kaizen quite early from the companies' establishment date or after a few years of establishment. It is evident because most of the companies implemented Kaizen prior to the year 2000.

From the implementation status discussed in Chapter 4, it was found that there was no sign for the Japanese companies to abandon the Kaizen implementation. Instead, Japanese companies were implementing Kaizen activities more aggressively and kept fine tuning the implementation with the intention to improve performance and gain vast benefits from the implementation. For example, JL1 implemented GATE activity prior to 2001 with a departmental group. However, JL1 found that the improvement conducted was not substantial,

hence changed the group arrangement to mix department instead to tackle bigger problems, which resulted in bigger improvement impact. After a few years, JL1 expanded the improvement to small improvement as well in order to get the improvement benefits at the low hanging fruits, which were at the operator level. Another example is JM1 who changed the improvement duration from three months to six months in order to conduct bigger projects.

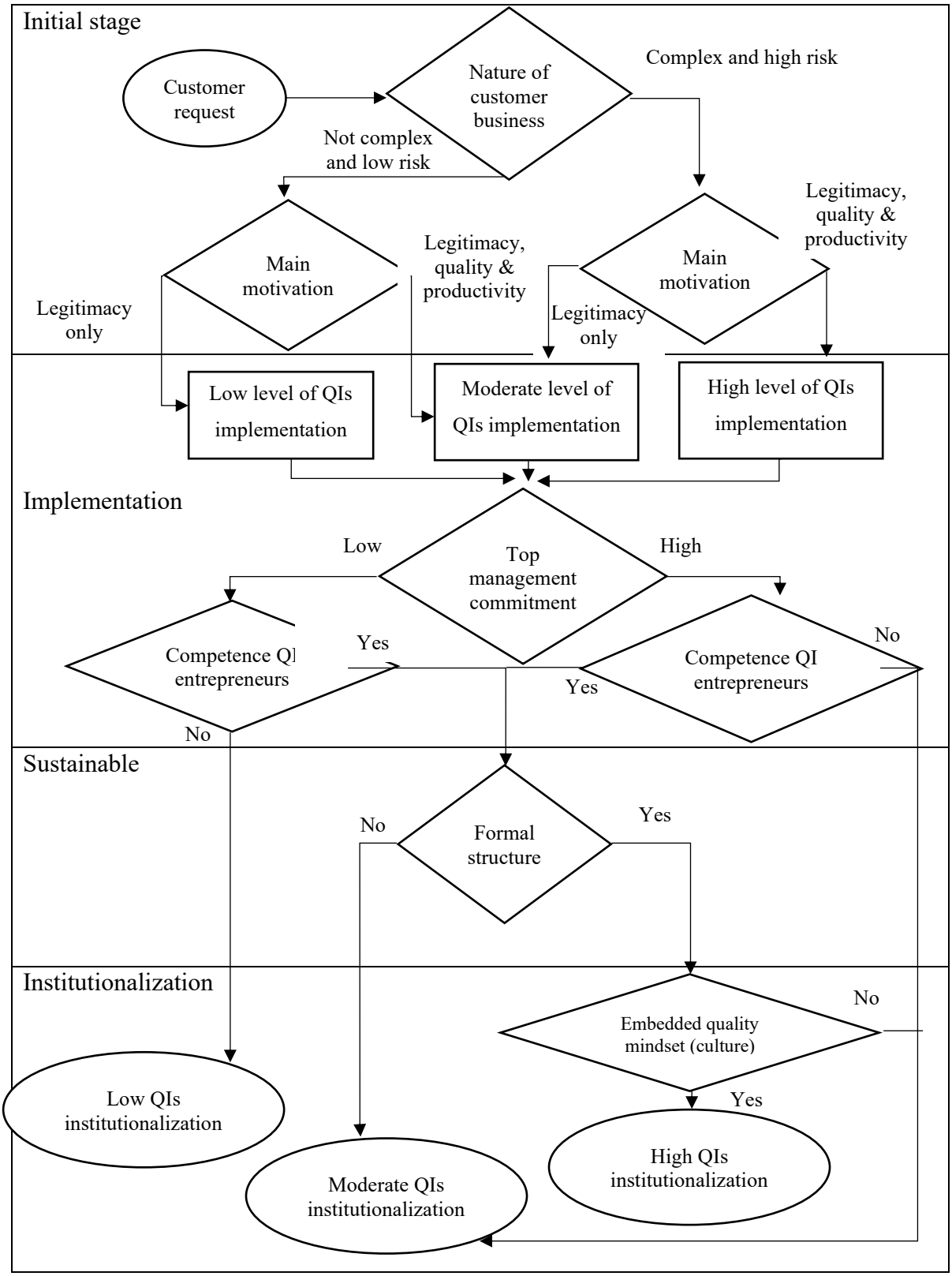
HQ provided a sustainable method and system in order to ensure the subsidiaries in Malaysia kept striving in implementing the continuous improvement activities. Among the methods utilized by HQ were providing policy and guidelines, sending expatriate and expertise to be stationed at subsidiaries in Malaysia, hiring Japanese speakers for smooth communication and yearly audits and evaluations from HQ and global portal to expedite between group communication. Therefore, it can be concluded that HQ was the impetus for the QI implementation in Japanese companies in Malaysia. Furthermore, HQ gives enough momentum to push the companies to keep implementing Kaizen activities, which are unlikely to be abandoned in the near future.

6.11 Establishment of Research Proposition

Figure 6.18 depicts the QIs institutionalization logics based on the findings derived from the analysis. The logics consists of four stages which is initial, implementation, sustainable, and institutionalization. The main factors effecting the QIs implementation are due to nature of customers' business and motivation. Manufacturing companies are operating in a highly competitive field and are highly affected by market requirements. From within sector and cross case sector analysis, it was found that the QI implementation level was highly correlated with the nature of customers' business such as the complexity of the product produced, the company position in the supply chain and level of risk. These factors are affecting the QI level of implementation as proposed in Proposition 1.

Proposition 1: Level of QIs implementation is closely related to the immediate supply chain sector requirements.

Figure 6. 18. *QIs Institutionalization Logics*



Note. Developed by the author.

It is evident that most of the Japanese manufacturing companies, except for JS1, had a tight coupling between the management system and QIs due to companywide internalization process in line with the desire to improve product quality and productivity. However, the customers' buying power that serves as an external driving force influenced the decision in adopting the QI implementation and whether the QI practices affect the core practices. For example, MM4 decided not to be certified with IATF 16949 and fully implement the standard requirements because the customer orders from the automotive industry were not so frequent and small in numbers. Besides that, ML2 demonstrated decoupling activities for Six Sigma because ML2 executed the Six Sigma projects due to customer request. The Six Sigma program became inactive once there was no customer request. Since ML2 implemented SGA activities, Six Sigma could be considered as a redundant program which is implemented as and when required by customers.

Proposition 2: Level of QIs implementation (decoupling or tight coupling) is closely related to the origin of the driving force.

As for the implementation stage, top management commitment and competence employees played an important role in the QIs implementation, and thus the institutionalization. The top management commitment both in physical and moral support is a must to boost the QIs implementation. It was found that most of the Japanese companies were having a higher institutionalization level because the companies provided both physical and moral support, such as reward recognition and were actively involved in the QIs activities. It was evidence as well for the Malaysian companies. For example, MS1 LM initiative was driven by top management. Thus, MS1 still continue to implement LM initiative even the manager in charge perceived that the implementation were not so beneficial.

Proposition 3: The degree of QI institutionalization is strongly related to the level of coercive pressure imposed by the management leadership and commitment.

Some of the Japanese companies attained extra length in strengthening the benchmarking (mimetic pressure) and education (normative pressure) bases, especially for JL1, JL2, and JL3 with frequent information sharing and special education system. Besides, the density of normative pressures from external such as training providers and consultants were

not strong enough to push companies to continue implementing the QIs. This finding was supported by clear evidence that JS1 and MM2 improvement activities decreased due to the resignation of assigned PICs. Therefore, it is essential for companies to ensure the availability of QI entrepreneurs. Besides, the competency of the QI entrepreneur is essential in guiding and coordinating the QI implementation. Thus, Proposition 4 is as below:

Proposition 4: The degree of QI institutionalization is strongly related to the normative pressure imposed by QIs entrepreneur.

From the important factors and degree of institutionalization analysis, it was found that manufacturing companies with a higher degree of institutionalization had dedicated committees and PIC with higher levels of regulative and technical-rational bases. As evidence, JS1 and Malaysian companies have lower degrees of institutionalization due to ad hoc basis practices. This practice will lead to the lack of formal structure, routine-reproduce and rules/systems. Therefore, Proposition 5 is:

Proposition 5: The degree of QI institutionalization is strongly related to the level of regulative (coercive pressure) imposed internally by the management system via formal structure.

Besides formal structure, embedded quality mindset (culture) is essential as stated in the proposition 6. Employees are the one that would execute the implementation. Without employees' high quality mindset and involvement, employees will have low awareness hence lack of self-initiative to conduct any improvement. As a result, QIs institutionalization process will be slowed and halted.

Proposition 6: The degree of QI institutionalization is strongly related to the employees' embedded quality mindset (culture).

6.12 Enfolding Literature and Conclusion

A comparison between relevant theories and the research findings were conducted to assess and fill in relevant research gaps, hence further enrich the literature. Proposition 1 and proposition 2 were basically answering RQ1, convergence and divergence practices. Based on proposition 1, the QIs implementation level was closely related to the supply chain sector

requirements. It was found that the implementation level was influenced by the nature of customers' business and the driving forces. Previous researchers have highlighted diverse results of the effect of company size and age context to the QIs implementation. Several studies demonstrated significant positive effects (Taylor & Wright, 2003) but some concluded that there was no significant difference (Sinha & Dhall, 2020). However, from this research, instead of size and age context only, the complexity of customers' business and the level of risk did influence the level of implementation. Therefore, this research brought insight reasons behind that may be contributed to the previous research equivocal findings of the effect of company size and age context.

In addition, institutional theorist had highlighted that early adopters were driven by technical aspects while late adopters were driven by legitimacy (DelliFraine & Langabeer, 2009). However, based on proposition 2, the level of QIs implementation (decoupling or tight coupling) was closely related to the origin of the driving force. It was found that the adoption was closely related to top management and QI entrepreneurs' motivation. Some of the late adopters (e.g., ML1) which lacked top management commitment and QI entrepreneurs motivation did implement QI due to market legitimacy. However, most of the adopters (e.g. MS2) revealed that technical reasons were the main driver for the QIs implementation.

Similar to the case of the Japanese manufacturing companies (except JS1) which demonstrated high internalization hence resulting in tight coupling practices. However, some manufacturing companies decided to adopt decoupling strategies that would enable them to take into account stakeholders' concerns (Buysse & Verbeke, 2003) without many changes to their technical core practices (Delmas & Montes-Sancho, 2010). This statement was in line with the QI practices of ML2 and MM4. ML2 demonstrated decoupling activities for Six Sigma, whereby the Six Sigma projects were only carried out as and when required by customers. Similar practices were implemented by MM4. MM4 decided not to fully implement IATF 16949 and chose to implement relevant practices only. Therefore, the research findings agreed with the fact that QIs adoption motivation in manufacturing industries was driven by technical rationality throughout (Love and Cebon, 2008) but the level of implementation varied due to adoption motivation and institutional pressures imposed. Therefore, this research casts a new point of view that the adoption motivation and institutional pressures are complex and do affect the level of QIs implementation.

As for RQ2, there were four factors identified that gave a big impact to the degree of QIs institutionalization. First factor as mentioned in proposition 3 which suggested a strong relation between QI institutionalization and coercive pressure imposed by the management leadership and commitment at the implementation stage. This research supported the previous research findings that top management leadership and commitment do play an essential role to ensure the sustainability of the QIs implementation. Top management were capable to apply coercive pressures because of their power as superior that enable them to influence the organization's decisions or actions (Sharpe, 2006). The Corley and Gioia diagram explicitly visualizes the important practices that the management should consider in ensuring efficient QIs implementation such as providing moral and physical support, rapid communication, proper structure, and competent employees. Therefore, instead of just emphasizing the importance of top management leadership and commitment, this research provides a detailed explanation and highlights a few important practices that should be implemented by the top management in manufacturing companies.

Second factor was the need to have competence QI entrepreneurs who were able to impose normative pressure at the implementation stage as mentioned in proposition 4. Competence QI entrepreneurs were essential in guiding and coordinating the QI implementation. It was found that normative pressure presence at early stage and implementation stage due to QI entrepreneurs' initiatives (e.g., MM1, MM2 and MM3). Previous findings by Braunscheidel et al. (2011) related to Six Sigma implementation highlighted that coercive and mimetic pressures presence at the early stage while the presence of normative pressure was evident only at the implementation stage. Therefore, instead at implementation stage only, this research findings highlighted that normative pressures may present during the early stage due to QIs entrepreneurs' initiatives.

Third factor was the need for regulative (coercive pressure) imposed internally by the management system via a formal structure as stated in proposition 5. From the assessment conducted, it was found that manufacturing companies with a higher degree of institutionalization had a formal structure with higher level of rules and system to ensure the routine is frequently implemented. This was in line with a statement by Meyer and Rowan (1977) that as rationalized institutional rules arise in given domains of work activity, formal organizations formed and expanded by incorporating these rules as structural elements. In addition to that, Zeitz et al. (1999) suggested five bases of evaluation (model, culture, education, regulative, and technical-rational) to assess the QIs institutionalization. One of the reasons the

Japanese companies except JS1 had a higher level of QIs institutionalization was due to regulative base. As for most of Malaysian companies and JS1, the QIs activities were based on ad hoc basis which led to a lower degree of QIs institutionalization. Therefore, it can be concluded that formal structure is essential to ensure the sustainability and institutionalization of the QIs implementation.

Management should focus on the regulative (coercive pressure) to kick-start the implementation by ensuring the availability of QI entrepreneurs or assigned PICs to drive the implementation. From the research findings, it was found that without the QIs entrepreneurs, the QIs implementation is at risk of collapsing and dissolved. It was evidence when JS1 and MM2 improvement activities had decreased due to their PIC had resigned. This finding was supported by Gonzalez's (2011) findings that the migration of TQM in a Spanish electrical company was unsuccessful due to the lost of custodians and entrepreneurs. It was found that establishing a QI committees is the best way to ensure that the QI activities can be conducted autonomously. Therefore, this research expands the Gonzalez (2011) findings and suggests a solution to achieve high level of QIs institutionalization.

Fourth factor was related to the employees' embedded quality mindset (culture). Culture is one of the primary carriers of institutionalization (Jepperson, 1991,p. 150). It was found that the Japanese and Malaysian companies had some difficulties to retain the culture due to foreign workers and higher manpower turnover. However, the Japanese companies had slight advantages due to longer years of implementation, top management full commitment, dedicated committees, frequent monitoring and awareness training. Therefore, Japanese companies employees had a higher degree of acceptance resulted from the activities conducted. This research findings is in agreement with the previous research that the rate of institutionalization of certain practices varies depending partially on duration of the established institution and the degree of acceptance by collective members (Yang et al., 2020). Therefore, it is recommended for management to benchmark Japanese companies practices in embedding the culture, such as frequent monitoring via patrol and meeting, and to conduct various awareness training.

As for RQ3 which is related to QIs dissemination in manufacturing companies in Malaysia, the research findings disagreed with the previous findings, whereby the early adopters were driven by technical aspects while late adopters were driven by legitimacy (DelliFraine & Langabeer, 2009). It was found that the driving force was closely related to top management and QI entrepreneurs' motivation instead of early or late adopters context. The

research findings agreed with Love and Cebon (2008) findings that adoption motivation were driven by technical rationality throughout the diffusion stage, but the level of implementation varied due to adoption motivation and institutional pressures imposed. In addition, the research findings also agreed with Lo and Yeung (2018) who challenged the predominant viewpoints that manufacturing companies, which operated in a highly technical environment faced minimum institutional pressures (Oliver, 1997). As for actors who played the main role in QIs implementation and dissemination at Japanese and Malaysian manufacturing companies, the primary and secondary actors influencing the implementation were identified. Previous research found that consultants and academician played the main role in disseminating the LM practices (Spicer, 2008) and rapid dissemination of Six Sigma in the U.S. might be due to professional agencies (e.g. ASQ), universities, and professional networks (Braunscheidel et al., 2011). As for Malaysia, almost similar findings were found. However, customers and multinational/large companies imposed strong coercive pressures for the manufacturing companies to adopt certain QIs in order to fulfil market legitimacy. At national level, MPC who is responsible for quality and productivity development in Malaysia built wide connection with agencies from Japan, Germany and the United States of America. However, main assistant received were from Japanese agencies and consultants via partnership program. Therefore, it can be concluded that QIs implementation in Malaysia received a big influence from the Japanese management system.

As for the QIs institutional logic identified, this study lays the empirical study in terms of important practices in the manufacturing industry that impact the QIs institutionalization. Dubey et al. (2018) conducted a study examining top management commitment to TQM diffusion using institutional and upper echelon theories. Coercive pressures, normative pressure, mimetic pressure, and top management commitment were found as strong predictors of TQM implementation. Dubey et al. findings were in line with this research case study findings. However, since the study was based on quantitative study, detailed explanations and the reasons affecting the implementation and diffusion were not clearly stated. The QIs institutional logics proposed 4 stages of implementation and provided detail explanation of the important practices in manufacturing industry that impact the QIs institutionalization.

CHAPTER 7: CONCLUSION

In conclusion, this research qualitatively examined the convergence, and divergence practices between Japanese and Malaysian companies, the degree of QI institutionalization, and how QIs are disseminated in manufacturing companies in Malaysia associated with the institutional theory approach. This research discovered the convergence and divergence practices between the Japanese and Malaysian manufacturing companies. One of the reasons that contributed to the convergence of QI practices was due to ISO 9001 requirements influence. Besides, customer audit and supplier management system increased the interaction between companies, which increased the possibilities of influencing each other. In terms of divergence practices, most Malaysian companies implemented the QIs in order to obtain legitimacy (coercive pressures from customers) while Japanese companies focused on internalization (mimetic pressures (benchmarking) and HQ direction (near peer coercive pressure). Moreover, the sources of knowledge dissemination are different, whereby most of the Japanese companies received direct sources of knowledge from HQ while Malaysian companies received them from various sources (training providers and multinational companies).

This research also concluded that the degree of institutionalization for the Japanese manufacturing companies was higher than the Malaysian manufacturing companies due to their extra effort on regulative and technical-rational bases to sustain the QIs implementation. With regard to how the QI implementation are disseminated to manufacturing industry in Malaysia, HQ was the main impetus for QI implementation in the Japanese manufacturing companies while Malaysian manufacturing companies rely heavily on internal experts, training providers, government agencies and customers. At national level, it can be concluded that Japanese agencies and consultants provides a great influence in disseminating the knowledge of QIs via partnership program with Malaysian government agencies. Even Malaysian manufacturing companies are still lagging behind Japanese manufacturing companies, the idea of quality initiative is becoming a norm both at industry and national level.

From the findings, a diagram of QIs institutionalization logics was generated based on the six propositions. The propositions suggest that the level of QIs implementation is closely related to the nature of customers' business and the origin of the driving force. In order to ensure smooth sailing of QI institutionalization, companies need to put extra effort on garnering top management commitment both physical and moral support, competent QI entrepreneurs, formal structure and embed employees' quality mindset.

For the practical implication, this research contributed to a better understanding of how institutional isomorphism mechanism and other contextual factors influence the QI implementation. Moreover, this research is anticipated to deliver an important message to manufacturing companies and the key actors corresponding to the institutional pressures and find ways in leveling up the degree of QI institutionalization. Managers may be able to get an overview and look at some of the lessons learned in helping their interpretive viability to fit the practices based on organization's specific conditions. Besides, for the agencies and policymakers such as the government, they can benchmark the practices and entities established for QI dissemination effort and adapt accordingly.

The originality and value of this research lie with the effort in identifying the dynamics of QI research in the manufacturing industry, understand current QI implementation, and how the QIs are disseminated and institutionalized in a developing country from institutional approach perspectives. Since there is still no in-depth comparative research conducted utilizing a case study strategy examining QIs dissemination and institutionalization between Japanese and Malaysian companies, it is expected that this research will add, enrich, and contribute to the literature. Most of the QIs research is inclined to investigate QIs implementation from the technical logic and efficiency point of view. Therefore, this research is able to contribute to a better understanding of QIs from the symbolic institutional theory perspective trajectory.

As for the theoretical contribution, this research summarized the QIs implementation elements and utilized an assessment method to gauge the level of QIs implementation. From the assessment conducted, it was found that the complexity of the customers' business and motivation are among the factors that influence the QIs implementation. These factors were seldom considered in the previous research. Thus, the findings bring new insight into the new factors affecting the QIs implementation and lay the reasons that may contribute to the previous research equivocal findings on the effect of various contexts. Besides, this research improvised the study conducted by Zeitz et al. (1999) and Gonzalez (2011) by including an assessment method to assess the level of QIs institutionalization hence extending the previous literature. Furthermore, the QIs institutional logic as depicted in Figure 6.17 improvises Dubey et al. (2018) findings and relates the logic with real practices for better understanding. To add, the propositions derived explain further in detail the reasons and how the factors are affecting the implementation and institutionalization.

CHAPTER 8: RECOMMENDATIONS AND LIMITATIONS

This research is anticipated to further contribute to sociology and organizational studies in shaping and sustaining the QI implementation; hence, institutionalization from the institutional theory perspectives. Besides, the number of existing shortcomings must be further discussed that can be associated with qualitative studies. Obstacles or barriers on the low implementation of other quality initiatives, especially Lean Manufacturing and Six Sigma, should be further investigated on manufacturing companies in Malaysia. Obviously, the discovered findings of the conducted case study may differ with other sectors (e.g., agriculture, education), company backgrounds (e.g., European or American companies, multinational companies, non-certified ISO 9001 company), and service-based organizations.

Therefore, future research with a broader participation from potential companies might be appropriate to discover new results, and subsequently extend the literature of sociology and organizational studies, which correspond to QI implementation. In addition, even though 14 manufacturing companies presented multiple outputs to represent the existing culture in Malaysian manufacturing industries, future research with regard to similar objectives, but covering more new cases, are encouraged to enhance the generalizability in the QI context. Since only two out of 14 reported cases were chemical-based manufacturing companies, the new case studies are preferred to explore more chemical-based manufacturing companies in order to examine the current chemical management practices toward environmental sustainability. Meanwhile, this research may also convey a significant message to the top management in Malaysian manufacturing companies to enhance their sensitivity with regard to various positive significant impacts in implementing quality initiatives comprehensively, as practiced by Japanese manufacturing companies and their HQ in Japan. For example, top management must demonstrate their commitment in introducing, enforcing, and monitoring QI implementation by frequent cooperation and communication with the workforce, as well as form a dedicated QI team to be responsible in executing the QIs, regardless of the types of process and product. To sustain the QI implementation, manufacturing companies, specifically Malaysian manufacturing companies, should strengthen the five bases of endogenous and exogenous resources, which consist of model (e.g., benchmarking with competitors), culture (e.g., employees awareness), education (e.g., established training modules), regulative (e.g., frequent meeting and monitoring), and technical rational (e.g., high quality and productivity thinking).

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APPENDICES

Appendix I: QIs elements critera

Author(s)	TQM
Abu-rumman (2020)	TQM practices: leadership and management (Khamalah and Lingaraj, 2007; Talib and Rahman, 2010); customer orientation and satisfaction (Mahapatra and Khan, 2006); workforce training and development (Ueno, 2008); employee involvement and engagement (Samat, Ramayah and Saad, 2006; Lakhal, Pasin and Limam, 2006); and continuous quality improvement and innovation (Fotopoulos and Psomas, 2009).
	TQM practices are often categorized into "hard" and "soft" TQM. "Hard" practices: statistical analysis or performance standards are used to assess quality and are most relevant to production and operations management, whereas "soft" practices have a more qualitative focus encompassing factors such as leadership, employee involvement in decision making and teamwork approaches (Yunis, Jung and Chen, 2013).
(Sinha and Dhall, 2020)	In the present study, TQM has been operationalized in terms of seven quality management principles (QMPs). These principles are: top management commitment (TMC), employee involvement (EI), process approach (PA), mutually beneficial supplier relationships (MBSR), customer orientation (CO), continual improvement (CI) and factual approach to decision-making (FADM). These principles have been selected from the eight QMPs on which ISO 9001:2000 standard (ISO, 2012) are based.
(Seetharaman et al., 2015)	The four basic beliefs of TQM philosophy mentioned by him are: absolute customer focus, employee empowerment, involvement and ownership; CI, and the use of systematic approaches to management.
	The key principles of TQM are: management commitment, employee empowerment, fact based decision making, CI, and customer focus.
	COQ program should be part of the TQM implementation especially in controlling the cost of manufacturing
(Al-Khadher, 2015)	The TQM approach is a model that puts more consideration into humanist change concepts (Burrell & Morgan, 1988).
(Silva et al., 2014)	Elements of a TQM culture such as teamwork/respect for people, employee training (Baird et al., 2011; Kaynak, 2003; Ahire and Dreyfus, 2000).
(Soltani & Wilkinson, 2010)	The TQM strategy is rooted in and shaped by four interlocking assumptions: (1) quality; (2) people; (3) organization; and (4) the role of senior management (Hackman and Wageman, 1995, p. 309).

Author(s)	TQM
(Green et al., 2009)	TQM is constituted by both the symbolic and the material (Zbaracki, 1998). On the material side, TQM encompasses physical tools, methodologies, and practices aimed at qual- ity improvement, including quality control circles, statistical process control, quality function deploy- ment, cross-functional teams, and benchmarking, to name a few (Deming, 1986; Ishikawa, 1985; Juran, 1989).
(Jung, 2008)	Customer satisfaction, quality control, and continuous improvement.
	Teamwork, individual empowerment, trust, cooperation, and other employee-friendly human resource practices constituted its essential foundations (Hackman and Wageman 1995; Abrahamson 1997).
(David & Strang, 2006)	Total quality management refers to the implementation of organization-wide quality improvement programs. Core principles include customer focus, reduction of variability, continuous improvement, and employee participation (Dean & Bowen, 1994; Hackman & Wageman, 1995). Operational elements generally include individual quality training, the formation of cross-functional process improvement teams, supplier partnerships, and quality councils. TQM thus combines a technical focus centered on statistical analysis of large volume processes with a behavioral focus on teamwork, empowerment, and culture change.
(Kitaw & Bete, 2003)	Quality control, focus on meeting customer requirements, improve continuously, the entire workforce must be involved, and employees must be empowered.
(Cameron & Sine, 1999)	Westphal, Gulati, and Shortell (997) claim TQM consists of four key quality dimensions: (1) customer focus, (2) CI, (3) structured problem-solving processes, and (4) employee empowerment.
	Hackman and Wageman (1995) propose customer focus, teamwork, supplier partnerships, process management, and use of statistical and scientific tools as the core dimensions.
	Garvin (1988) and Teboul (991) each identify seven dimensions: 1) quality as a competitive priority, (2) customer focus, (3) quality deployment, (4) quality incentives, (5) organization wide commitment, (6) top management commitment, and (7) progressive workforce practices.
	The Malcolm Baldrige National Quality Award claims to include a comprehensive set of dimensions: leadership as a driver of quality, information gathering and analysis, quality planning, quality assurance, and human resource management as process dimensions, and customer satisfaction and quality results as outcome dimensions.
	Greene (1993) reviewed quality practices in Japan and the United States and claims to have identified the comprehensive set of 24 TQM dimensions.

Author(s)	TQM
(Dooley & Flor, 1998)	Concepts like reduction of variation, defined and standardized processes, management by fact, causal thinking, etc. all stem from the "Newtonian" paradigm of control and equilibrium, as manifested in the principles and practices of scientific management. Yet, TQM also has a learning component to it. Employee involvement, empowerment, and cross-functional cooperation are an important part of TQM. TQM thus has both mechanistic (control) and organismic (adaptive learning) components (Anderson et al., 1994; Spencer, 1994).
(Morrow, 1997)	The Flynn et al. factors were: (1) top management support; (2) quality information (feedback); (3) process management; (4) product design; (5) workforce management; (6) supplier involvement; and (7) customer involvement.
	Customer focus, CI and teamwork.
(Fazzari & Mosca, 2009)	TQM is a culture, not just a program (Lawler, 1994).

Author(s)	QM (ISO 9001)
(Mutingi & Chakraborty, 2021)	Lakhal et al. (2006) identified 10 practices: top management commitment and support, organization for quality, employee training, employee participation, supplier QM, customer focus, continuous support, quality system improvement, information and analysis and statistical quality techniques.
(Sinha et al., 2020)	ISO 9001:2000 standard (ISO, 2012) are based on: 1) customer focus 2) leadership 3) involvement of people 4) PA 5) system approach to management 6) CI 7) factual approach to decision making 8) MBSR.
(Sinha et al., 2013)	Seven factors: 1) employee involvement 2) process and systems approach 3) top management commitment 4) mutually beneficial supplier relationship 5) customer orientation 6) factual approach to decision-making 7) continual improvement.
(Mellat-Parast & Digman, 2008)	QM goal are to establish a management system and an organizational culture that ensures customer satisfaction and CI (Sitkin et al., 1994; Hackman and Wageman, 1995; Kaynak, 2003).
	Effective implementation of QM is contingent upon a balance between control (stability and reliability) and learning (exploration and innovation).
(Boiral, 2003)	The principle "we say what we do, we do what we say," indicate the rational of reproduction of processes and power relationship. One of the main objectives is to perpetuate the practices in place so as to ensure work method continuity and product quality (Wealleans 2000, Mispelblom 1995).

Authors	Lean Criteria
(Inuwa & Rahim, 2020)	VSM, TPM, change management.
(Raval et al., 2018)	Lean stresses on pace, the flow of the process and waste (Muda)
(Raja et al., 2018)	8 wastes- transportation, inventory, motion, waiting-time, overproduction, over-processing, defects and unutilized skills (Sunder, 2016c).
	Methodology-five principles for CI (1) customers value (2) value stream mapping, (3) smooth flow (4) Pull system (5) Perfection
(Seetharaman et al., 2015)	8 wastes. Similar like D10 but change unutilized skills to people.
	Ways to eliminate wastes: a) Flexible resources b) Cellular layouts c) Pull production system d) Kanban production e) Small-lot production f) Quick set-ups g) Uniform production
	5S
(Bortolotti et al., 2015)	Soft LM practices (i.e., lean practices concerning principles, managerial concepts people and relations, such as small group problem solving, employees' training to perform multiple tasks, supplier partnerships, customer involvement, and CI), and hard LM practices (i.e., lean technical and analytical tools)
(Bortolotti et al., 2015)	LM is viewed through either a strategic/philosophical (e.g., Womack and Jones, 1996; Upton,1998) or operational/technical lens (e.g., Shah and Ward, 2003, 2007).
	Shah and Ward (2003) identifed and divided LM practices into JIT, total quality management (TQM), HRM, and total preventive maintenance (TPM) bundles. Internal-related practices (kanban, continuous flow, setup time reduction, TPM, statistical process control, and employee involvement) and supplier- and customer-related practices, such as JIT deliveries and supplier and customer involvement (Shah and Ward, 2007).
	Liker (2004) described the "Toyota way" according to 14 principles.
(Psomas et al., 2018)	Six lean principles: define value, define value, stream, flow, pull, standardization, and perfection.
(Costa et al., 2021)	The individual Lean and Six Sigma initiatives emphasis on a culture of continuous improvement, customer satisfaction, comprehensive employee involvement, and searching for the root causes (Laureani and Antony, 2017)

Author(s)	Kaizen
(Glover et al., 2015)	Two kaizen characteristics: experimentation and CI, and learning and stewardship.
(Imai, 1986)	3 types of kaizen: 1) Management, 2) Group, 3) Individual
(Brunet & New, 2003)	Categorized 4 types of kaizen activities): 1)Zero defect 2)Policy deployment 3)SGA 4)Suggestion scheme

Author(s)	Six Sigma
(Seetharaman et al., 2015)	Improvement and breakthrough results are accomplished through DMAIC methodology lead by dedicated practitioners called Six Sigma Black Belts.
(Sarkar, 2009)	DMADV Basic methodology consists of five steps: • Define, measure, analyze, design alternatives, and verify.
(Costa et al., 2021)	Understanding of customer needs, disciplined use of facts, data, and statistical analysis, and diligent attention to managing, improving, and reinventing business processes (Pande et al., 2000).

Appendix II: Research protocol

Code	Sections and Questions	References
QE	Quality Initiative Experience	
QE1	Besides ISO9001, is there any quality improvement program implemented? (e.g., QCC circle, Kaizen, Lean, Six Sigma etc.)	Kitaw & Bete, 2003
QE2	Could you provide reason(s) that led your company to implement the quality improvement program? (Customer, government, training provider, internal request?)	Sua´rez-Barraza & Ramis-Pujol, 2012 Kumar & Antony, 2008 Boiral (2011)) Lee (2009))
QE3	Could you explain the history of the implementation?	Sua´rez-Barraza & Ramis-Pujol (2010)
QE4	In order to implement the quality improvement program, did your company receive any assistance from external resources (customers, suppliers, government etc.?)	Ivanova et al. (2014)
MS	Management of System and Process, KPI and CI	
MS1	How your company manages & monitors the quality improvement program implementation?	Nonthaleerak & Hendry (2008) Wahid et al. (2011)
MS2	What is your company KPI? How you monitor the KPI?	Fuentes et al. (2006)
MS3	Could you provide two or three important examples related to quality improvement program implementation?	Nonthaleerak & Hendry (2008)
DB	Difficulties / Barriers, Important factors and Benefits	
DB1	What are the difficulties in implementing the quality improvement program? How your company resolve the difficulties?	Nonthaleerak & Hendry (2008) Boiral (2011) Suarez-Barraza & Ramis-Pujol (2012) Sua´rez-Barraza & Juan Ramis-Pujol (2010) Kumar & Anthony (2008)
DB2	What are the important factors that contribute to the success of the quality improvement program implementation?	Nonthaleerak & Hendry (2008) Wahid et al. (2011) Boiral (2011) Suarez-Barraza & Ramis-Pujol (2012) Sua´rez-Barraza & Ramis-Pujol (2010) Kumar & Anthony (2008)
DB3	Could you provide example of the benefits that you have gained after implementing the quality improvement program?	Nonthaleerak & Hendry (2008) Ivanova et al. (2014)

Code	Sections and Questions	References
ML	Management Leadership and Commitment	
ML1	Involvement level of management in quality improvement program implementation? Example of activities showing management commitment.	Nonthaleerak & Hendry (2008) Wahid et al. (2011)
ET	Education and Training	
ET1	Could you explain your company education system related to the quality improvement program?	Fuentes et al. (2006)
ET2	How your employees share their skills and expertise?	Kumar et al. (2014)
ET3	How you evaluate the effectiveness of your training/education program?	Miyagawa & Yoshida (2010)
RM	Resource Management	
RM1	What are the required resources in implementing quality improvement program? (e.g., database, trainer, equipment etc.)	Wahid et al. (2011) Ivanova et al. (2014)
CF	Customer Focus and Design Quality Management	
CF1	What are the methods to compile feedback from customers to improve your process or product quality?	Wahid et al. (2011) Sua´rez-Barraza & Ramis-Pujol (2010) Kumar & Anthony (2008)
CF2	How your company captured customers expected requirements during product development and design stage?	Powell (1995) Miyagawa & Yoshida (2010)
CF3	How your company monitor compliance to requirements, law and regulations?	Samuel et al. (2013)
SM	Supplier Management and Management Transfer from HQ to other Branches.	
SM1	Are you requesting your supplier to implement the quality improvement program as well?	Powell (1995)
SM2	Does your company have any other branches in Malaysia or overseas? Is there any product or process transfer involved?	Delbridge & Barton (2002)
SM3	If yes, what are the activities involves in ensuring smooth product or process transfer between those branches?	Kumar et al. (2014)
SM4	What are the main problems that arise during the transfer process that might affect quality of the products? How your company managing these problems?	Delbridge & Barton (2002)

Code	Sections and Questions	References
WE	Work Environment and Culture	
WE1	Is there any different in culture before & after the quality improvement program implementation?	Kitaw & Bete (2003)
WE2	Involvement level of employees in implementing the quality program?	Nonthaleerak & Hendry (2008)
WE3	Example of activity to increase your employee's motivation.	Wahid et al. (2011) Boiral (2011) Lee (2009)
WE4	How is the communication conducted to disseminate the quality improvement program internally and externally?	Wahid et al. (2011) Gunasekaran (1999)
WE5	What do you think about cooperation and teamwork in your department or between departments with the quality improvement program?	Gunasekaran (1999) Fuentes et al. (2006)
CP	Contingency Plan and Future Trend	
CP1	Economic crisis (1997, 2008), how your company react to the problem?	Schonberger (2007)
CP2	Is there any recommendation in order to improve the quality improvement program in future?	Kitaw & Bete (2003)
CP3	Is there any increasing trend (requirements, policy) for quality improvement program implementation within or between companies?	Dale (2003, p. 267)

Appendix III: Demographic data for 14 manufacturing companies in Malaysia

No.	Demographic information	
1	Company name (abbreviation)	JL1
2	Capital (RM: currency of Malaysia)	55,030,000
3	Ownership	Japanese
4	No. of employees	277
5	Category of company size	Large-size
6	Region	Central
7	Year of establishment	1993
8	Year of ISO 9001 certification	1997
9	Sector	Plastic
10	Category of product	Adhesive tape
11	General supporting information	More than 100 types of product

No.	Demographic information	
1	Company name (abbreviation)	JL2
2	Capital (RM: currency of Malaysia)	23,700,000
3	Ownership	Japanese
4	No. of employees	300
5	Category of company size	Large-size
6	Region	Central
7	Year of establishment	1988
8	Year of ISO 9001 certification	1997
9	Sector	Plastic
10	Category of product	Injection molding
11	General supporting information	25 types of machine in production line

No.	Demographic information	
1	Company name (abbreviation)	JL3
2	Capital (RM: currency of Malaysia)	325,000,000
3	Ownership	Japanese
4	No. of employees	390
5	Category of company size	Large-size
6	Region	Northern
7	Year of establishment	1992
8	Year of ISO 9001 certification	1994
9	Sector	Chemical
10	Category of product	Plastic resin
11	General supporting information	4 types of product

No.	Demographic information	
1	Company name (abbreviation)	JM1
2	Capital (RM: currency of Malaysia)	124,000,000
3	Ownership	Japanese
4	No. of employees	160
5	Category of company size	Medium-size
6	Region	Central
7	Year of establishment	1992
8	Year of ISO 9001 certification	1994
9	Sector	Machinery & Equipment (M&E)
10	Category of product	Wire copper
11	General supporting information	Approximately 500 types of product

No.	Demographic information	
1	Company name (abbreviation)	JM2
2	Capital (RM: currency of Malaysia)	5,303,200
3	Ownership	Japanese
4	No. of employees	147
5	Category of company size	Medium-size
6	Region	Central
7	Year of establishment	1994
8	Year of ISO 9001 certification	2003
9	Sector	Machinery and Equipment (M&E)
10	Category of product	Gear
11	General supporting information	Approximately 100 types of product

No.	Demographic information	
1	Company name (abbreviation)	JS1
2	Capital (RM: currency of Malaysia)	7,500,000
3	Ownership	Japanese
4	No. of employees	37
5	Category of company size	Small-size
6	Region	Central
7	Year of establishment	1988
8	Year of ISO 9001 certification	2002
9	Sector	Machinery and Equipment (M&E)
10	Category of product	Valves
11	General supporting information	Approximately 15 types of product

No.	Demographic information	
1	Company name (abbreviation)	ML1
2	Capital (RM: currency of Malaysia)	2,500,000
3	Ownership	Malaysian
4	No. of employees	300
5	Category of company size	Large-size
6	Region	Central
7	Year of establishment	1971
8	Year of ISO 9001 certification	2008
9	Sector	Plastic
10	Category of product	Adhesive tape
11	General supporting information	10 production lines

No.	Demographic information	
1	Company name (abbreviation)	ML2
2	Capital (RM: currency of Malaysia)	4,935,000
3	Ownership	Malaysian
4	No. of employees	320
5	Category of company size	Large-size
6	Region	Southern
7	Year of establishment	1993
8	Year of ISO 9001 certification	1997
9	Sector	Plastic
10	Category of product	Injection Molding
11	General supporting information	Supplier for Samsung and Panasonic

No.	Demographic information	
1	Company name (abbreviation)	MM1
2	Capital (RM: currency of Malaysia)	1,000,000
3	Ownership	Malaysian
4	No. of employees	120
5	Category of company size	Medium-size
6	Region	Central
7	Year of establishment	2014
8	Year of ISO 9001 certification	2001
9	Sector	Plastic
10	Category of product	Injection Molding
11	General supporting information	More than 200 types of product

No.	Demographic information	
1	Company name (abbreviation)	MM2
2	Capital (RM: currency of Malaysia)	56,010,050
3	Ownership	Malaysian
4	No. of employees	140
5	Category of company size	Medium-size
6	Region	Central
7	Year of establishment	2006
8	Year of ISO 9001 certification	2008
9	Sector	Machinery and Equipment (M&E)
10	Category of product	Valves
11	General supporting information	Approximately 20 types of product

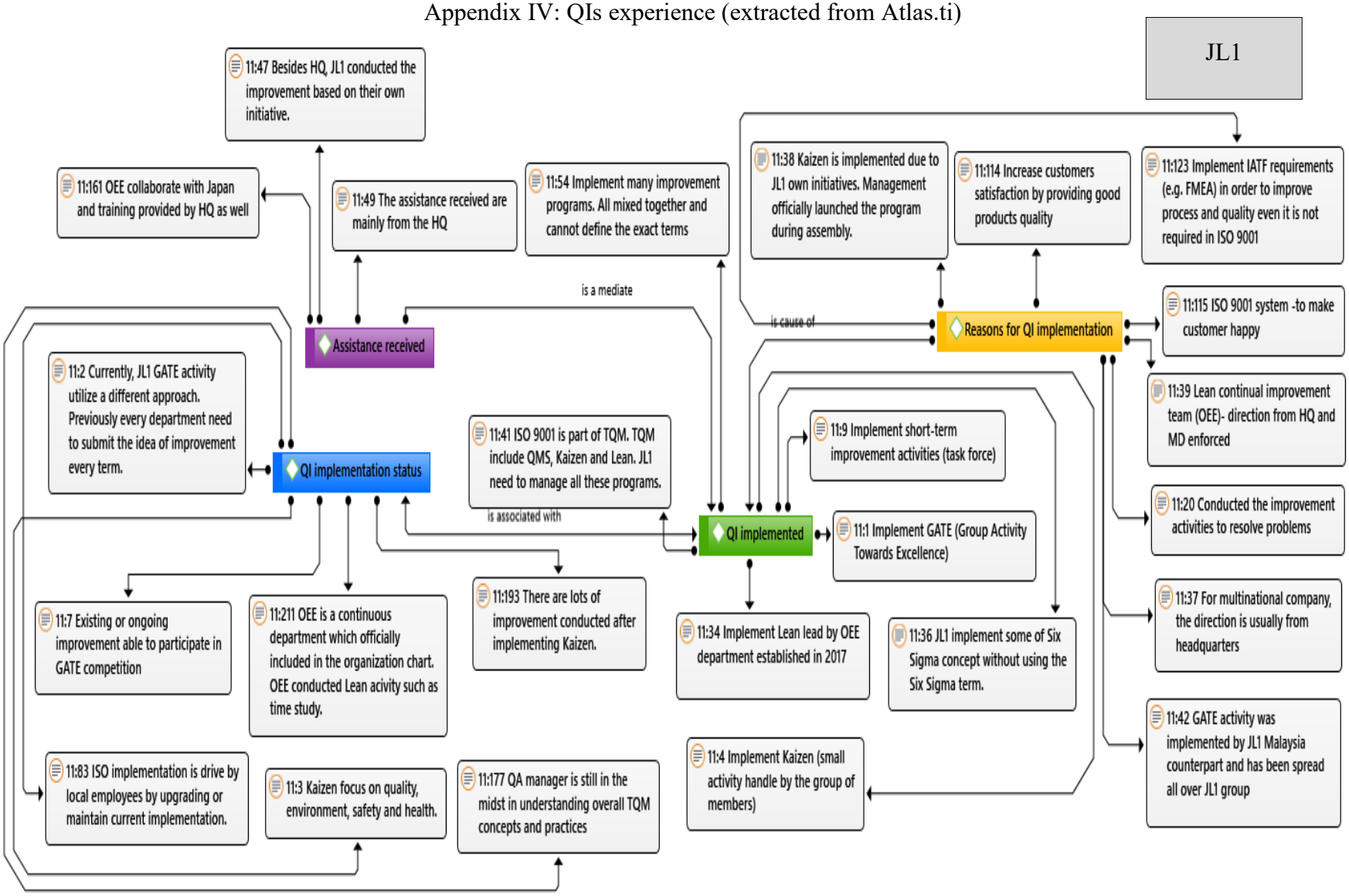
No.	Demographic information	
1	Company name (abbreviation)	MM3
2	Capital (RM: currency of Malaysia)	71,700,000
3	Ownership	Malaysian
4	No. of employees	100
5	Category of company size	Medium-size
6	Region	Southern
7	Year of establishment	1991
8	Year of ISO 9001 certification	1996
9	Sector	Machinery and Equipment (M&E)
10	Category of product	Cable and wire
11	General supporting information	More than 80 types of machine in production line

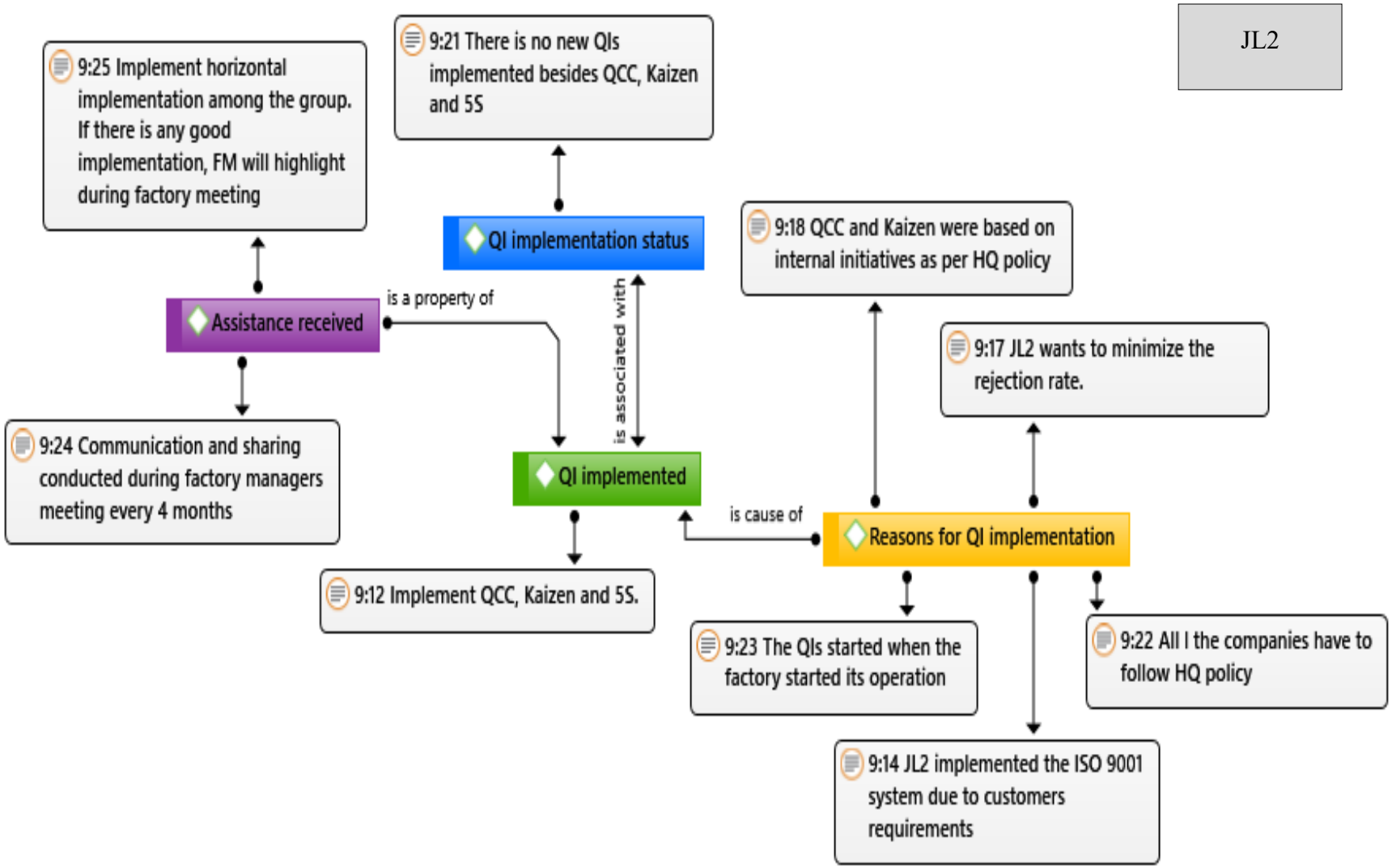
No.	Demographic information	
1	Company name (abbreviation)	MM4
2	Capital (RM: currency of Malaysia)	800,000
3	Ownership	Malaysian
4	No. of employees	125
5	Category of company size	Medium-size
6	Region	Southern
7	Year of establishment	1993
8	Year of ISO 9001 certification	2010
9	Sector	Machinery and Equipment (M&E)
10	Category of product	Precision machine
11	General supporting information	More than 200 types of product

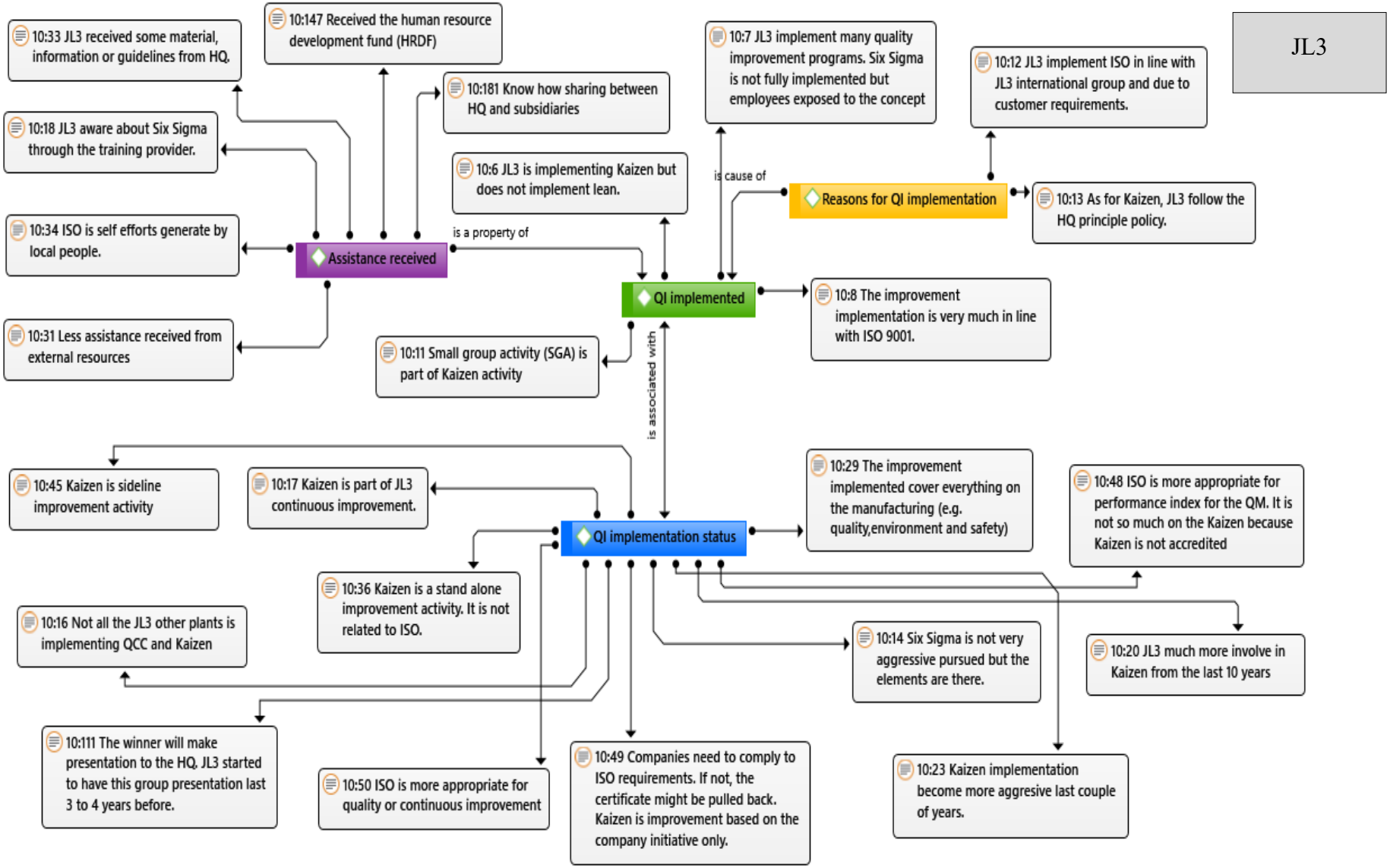
No.	Demographic information	
1	Company name (abbreviation)	MS1
2	Capital (RM: currency of Malaysia)	2,944,000
3	Ownership	Malaysian
4	No. of employees	29
5	Category of company size	Small-size
6	Region	Central
7	Year of establishment	2012
8	Year of ISO 9001 certification	2013
9	Sector	Machinery and Equipment (M&E)
10	Category of product	Valves
11	General supporting information	3 types of product

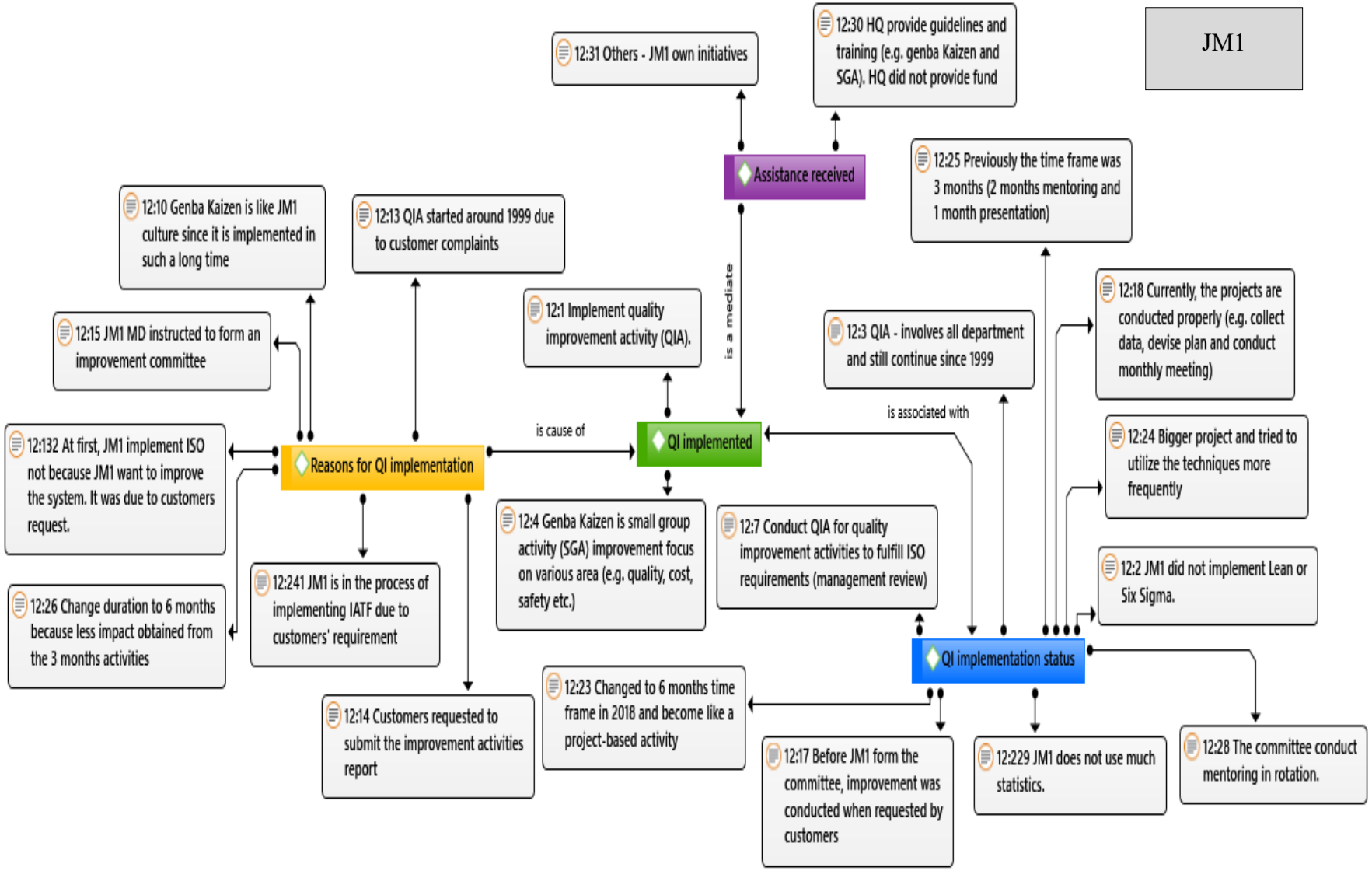
No.	Demographic information	
1	Company name (abbreviation)	MS2
2	Capital (RM: currency of Malaysia)	3,225,000
3	Ownership	Malaysian
4	No. of employees	57
5	Category of company size	Small-size
6	Region	Northern
7	Year of establishment	1999
8	Year of ISO 9001 certification	2010
9	Sector	Chemical
10	Category of product	Silicone, polymer and epoxy
11	General supporting information	More than 100 types of product

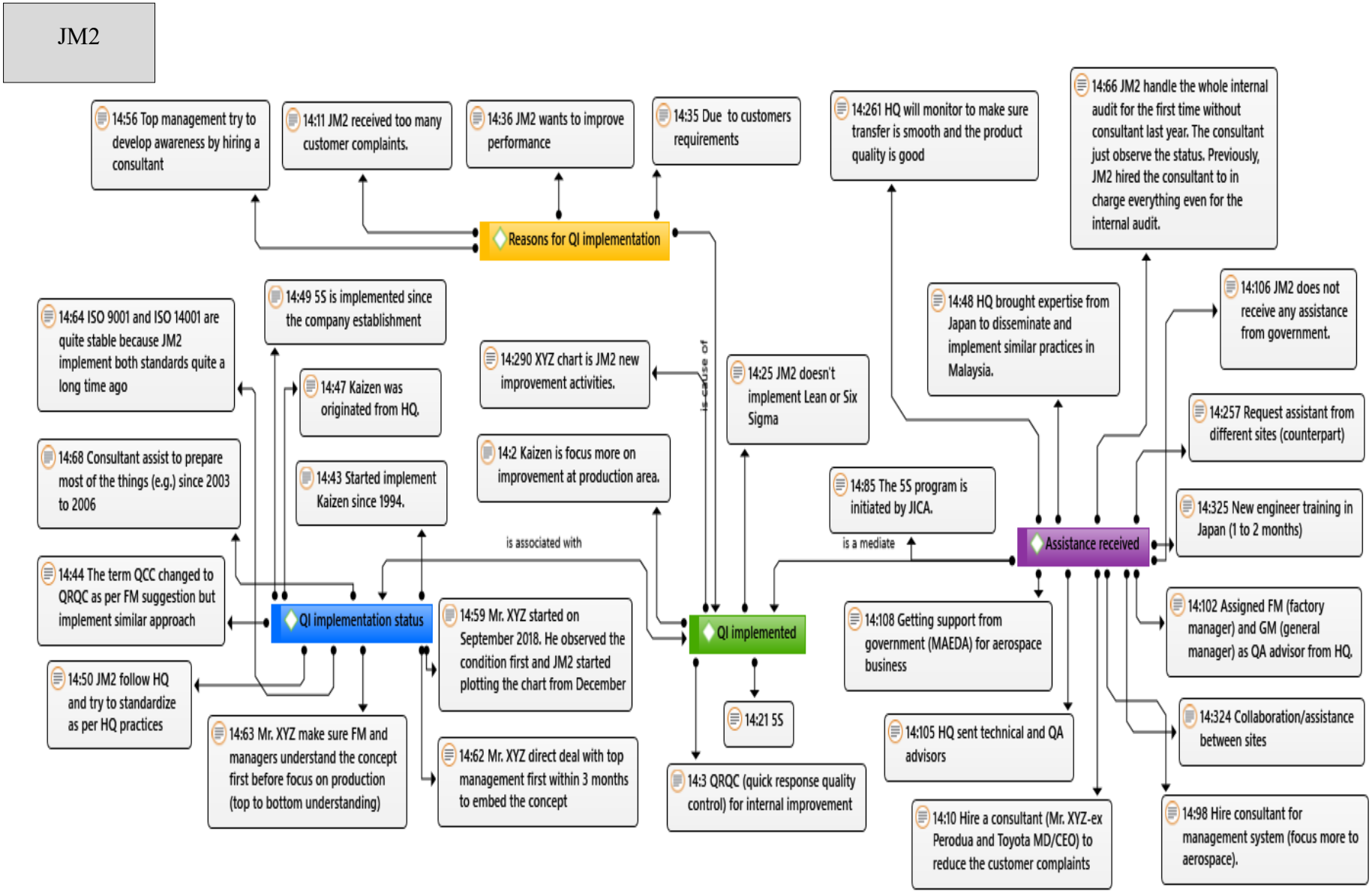
Appendix IV: QIs experience (extracted from Atlas.ti)



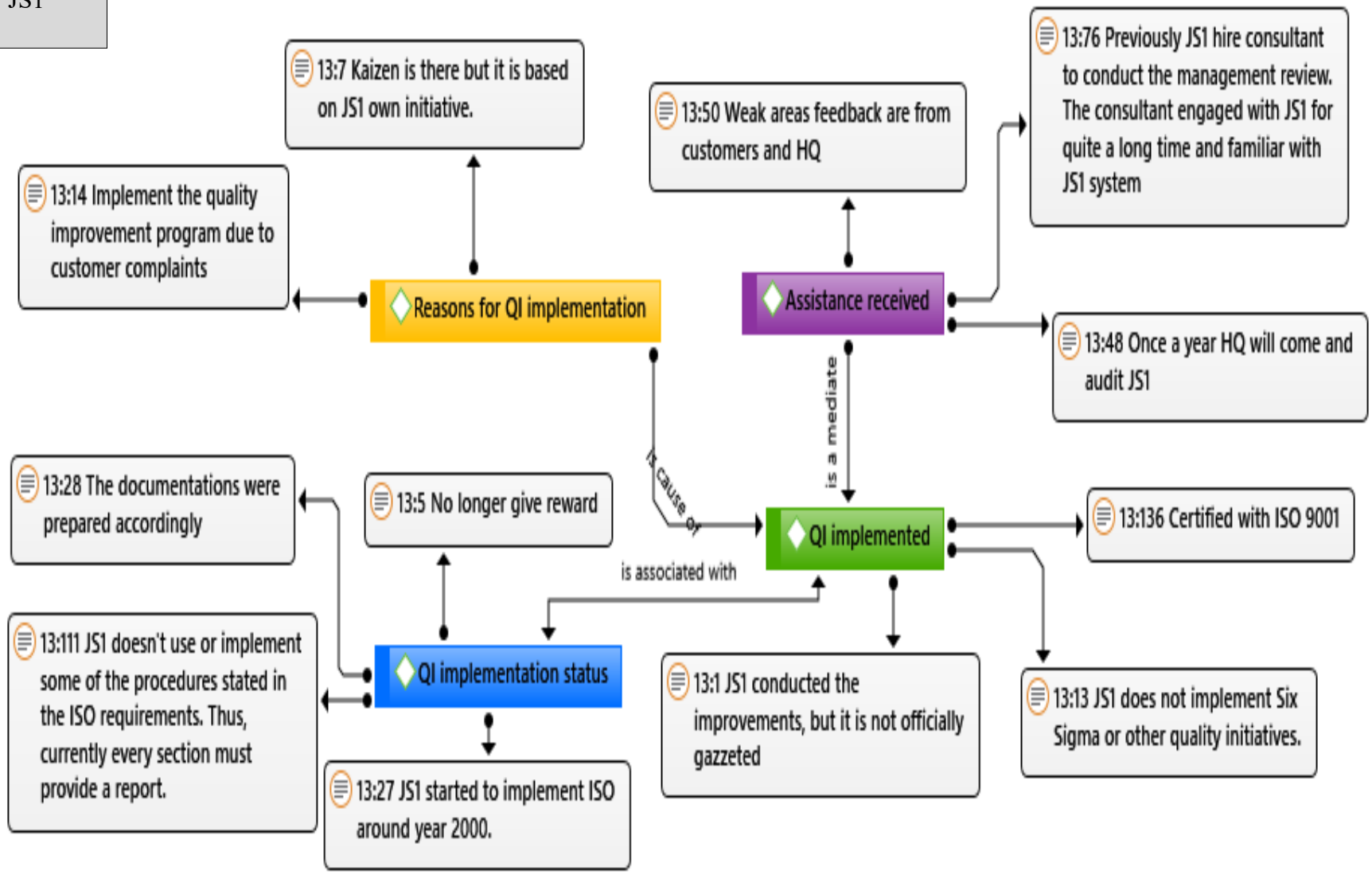

JL2
9:25 Implement horizontal implementation among the group. If there is any good implementation, FM will highlight during factory meeting
9:21 There is no new QIs implemented besides QCC, Kaizen and 5S
QI implementation status
9:18 QCC and Kaizen were based on internal initiatives as per HQ policy
Assistance received
is a property of
is associated with
9:17 JL2 wants to minimize the rejection rate.
9:24 Communication and sharing conducted during factory managers meeting every 4 months
QI implemented
is cause of
Reasons for QI implementation
9:12 Implement QCC, Kaizen and 5S.
9:23 The QIs started when the factory started its operation
9:22 All I the companies have to follow HQ policy
9:14 JL2 implemented the ISO 9001 system due to customers requirements


JL3
10:33 JL3 received some material, information or guidelines from HQ.
10:147 Received the human resource development fund (HRDF)
10:181 Know how sharing between HQ and subsidiaries
10:18 JL3 aware about Six Sigma through the training provider.
10:6 JL3 is implementing Kaizen but does not implement lean.
10:34 ISO is self efforts generate by local people.
Assistance received
is a property of
10:31 Less assistance received from external resources
10:7 JL3 implement many quality improvement programs. Six Sigma is not fully implemented but employees exposed to the concept
10:12 JL3 implement ISO in line with JL3 international group and due to customer requirements.
is cause of
Reasons for QI implementation
10:13 As for Kaizen, JL3 follow the HQ principle policy.
QI implemented
10:8 The improvement implementation is very much in line with ISO 9001.
10:11 Small group activity (SGA) is part of Kaizen activity
is associated with
10:45 Kaizen is sideline improvement activity
10:17 Kaizen is part of JL3 continuous improvement.
QI implementation status
10:29 The improvement implemented cover everything on the manufacturing (e.g. quality,environment and safety)
10:48 ISO is more appropriate for performance index for the QM. It is not so much on the Kaizen because Kaizen is not accredited
10:36 Kaizen is a stand alone improvement activity. It is not related to ISO.
10:16 Not all the JL3 other plants is implementing QCC and Kaizen
10:14 Six Sigma is not very aggressive pursued but the elements are there.
10:20 JL3 much more involve in Kaizen from the last 10 years
10:111 The winner will make presentation to the HQ. JL3 started to have this group presentation last 3 to 4 years before.
10:50 ISO is more appropriate for quality or continuous improvement
10:49 Companies need to comply to ISO requirements. If not, the certificate might be pulled back. Kaizen is improvement based on the company initiative only.
10:23 Kaizen implementation become more aggresive last couple of years.

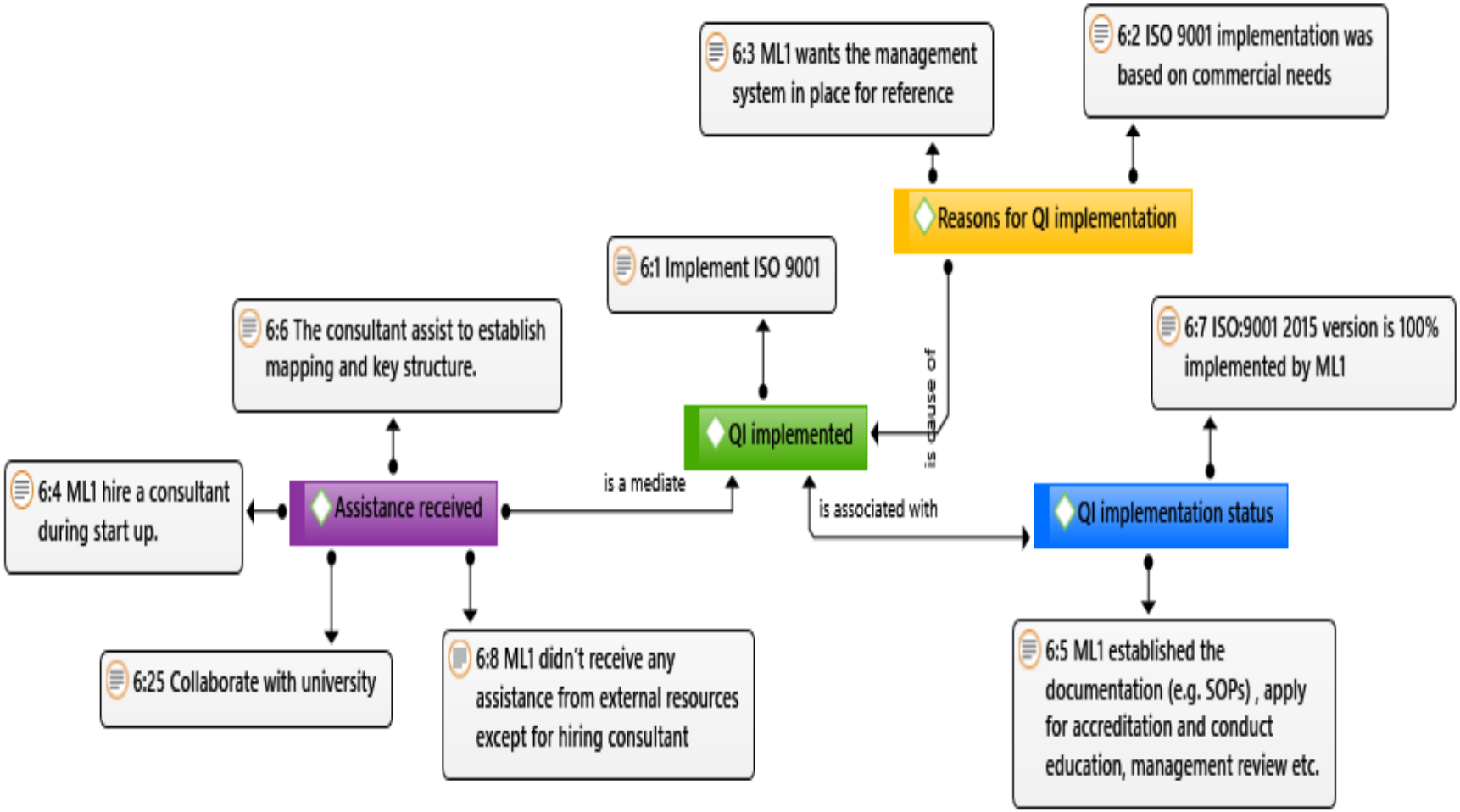

JM1
12:31 Others - JM1 own initiatives
12:30 HQ provide guidelines and training (e.g. genba Kaizen and SGA). HQ did not provide fund
Assistance received
12:25 Previously the time frame was 3 months (2 months mentoring and 1 month presentation)
12:10 Genba Kaizen is like JM1 culture since it is implemented in such a long time
12:13 QIA started around 1999 due to customer complaints
is a mediate
12:1 Implement quality improvement activity (QIA).
12:3 QIA - involves all department and still continue since 1999
12:18 Currently, the projects are conducted properly (e.g. collect data, devise plan and conduct monthly meeting)
12:15 JM1 MD instructed to form an improvement committee
is associated with
12:132 At first, JM1 implement ISO not because JM1 want to improve the system. It was due to customers request.
Reasons for QI implementation
is cause of
QI implemented
12:24 Bigger project and tried to utilize the techniques more frequently
12:4 Genba Kaizen is small group activity (SGA) improvement focus on various area (e.g. quality, cost, safety etc.)
12:7 Conduct QIA for quality improvement activities to fulfill ISO requirements (management review)
12:2 JM1 did not implement Lean or Six Sigma.
12:241 JM1 is in the process of implementing IATF due to customers' requirement
12:26 Change duration to 6 months because less impact obtained from the 3 months activities
QI implementation status
12:14 Customers requested to submit the improvement activities report
12:23 Changed to 6 months time frame in 2018 and become like a project-based activity
12:17 Before JM1 form the committee, improvement was conducted when requested by customers
12:229 JM1 does not use much statistics.
12:28 The committee conduct mentoring in rotation.


JM2
14:56 Top management try to develop awareness by hiring a consultant
14:11 JM2 received too many customer complaints.
14:36 JM2 wants to improve performance
14:35 Due to customers requirements
Reasons for QI implementation
14:261 HQ will monitor to make sure transfer is smooth and the product quality is good
14:66 JM2 handle the whole internal audit for the first time without consultant last year. The consultant just observe the status. Previously, JM2 hired the consultant to in charge everything even for the internal audit.
14:64 ISO 9001 and ISO 14001 are quite stable because JM2 implement both standards quite a long time ago
14:49 5S is implemented since the company establishment
14:47 Kaizen was originated from HQ.
14:290 XYZ chart is JM2 new improvement activities.
is cause of
14:25 JM2 doesn't implement Lean or Six Sigma
14:48 HQ brought expertise from Japan to disseminate and implement similar practices in Malaysia.
14:106 JM2 does not receive any assistance from government.
14:257 Request assistant from different sites (counterpart)
14:68 Consultant assist to prepare most of the things (e.g.) since 2003 to 2006
14:43 Started implement Kaizen since 1994.
14:2 Kaizen is focus more on improvement at production area.
14:85 The 5S program is initiated by JICA.
is a mediate
Assistance received
14:325 New engineer training in Japan (1 to 2 months)
is associated with
14:44 The term QCC changed to QRQC as per FM suggestion but implement similar approach
QI implementation status
14:59 Mr. XYZ started on September 2018. He observed the condition first and JM2 started plotting the chart from December
QI implemented
14:108 Getting support from government (MAEDA) for aerospace business
14:102 Assigned FM (factory manager) and GM (general manager) as QA advisor from HQ.
14:50 JM2 follow HQ and try to standardize as per HQ practices
14:21 5S
14:105 HQ sent technical and QA advisors
14:324 Collaboration/assistance between sites
14:63 Mr. XYZ make sure FM and managers understand the concept first before focus on production (top to bottom understanding)
14:62 Mr. XYZ direct deal with top management first within 3 months to embed the concept
14:3 QRQC (quick response quality control) for internal improvement
14:10 Hire a consultant (Mr. XYZ-ex Perodua and Toyota MD/CEO) to reduce the customer complaints
14:98 Hire consultant for management system (focus more to aerospace).

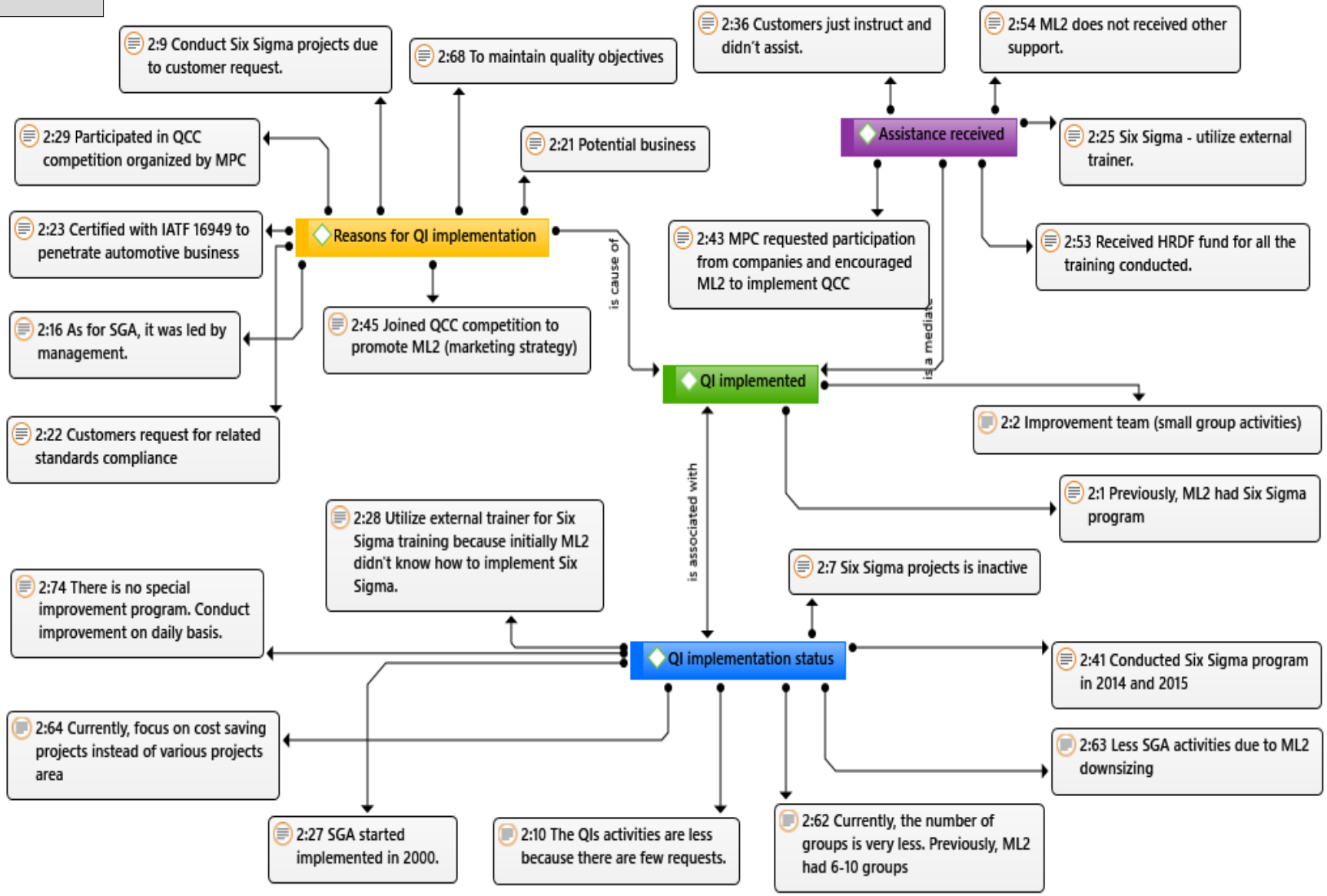
JS1


13:7 Kaizen is there but it is based on JS1 own initiative.
13:50 Weak areas feedback are from customers and HQ
13:76 Previously JS1 hire consultant to conduct the management review. The consultant engaged with JS1 for quite a long time and familiar with JS1 system
13:14 Implement the quality improvement program due to customer complaints
Reasons for QI implementation
Assistance received
13:48 Once a year HQ will come and audit JS1
is a mediate
is cause of
13:28 The documentations were prepared accordingly
13:5 No longer give reward
QI implemented
13:136 Certified with ISO 9001
is associated with
13:111 JS1 doesn't use or implement some of the procedures stated in the ISO requirements. Thus, currently every section must provide a report.
QI implementation status
13:1 JS1 conducted the improvements, but it is not officially gazzeted
13:13 JS1 does not implement Six Sigma or other quality initiatives.
13:27 JS1 started to implement ISO around year 2000.

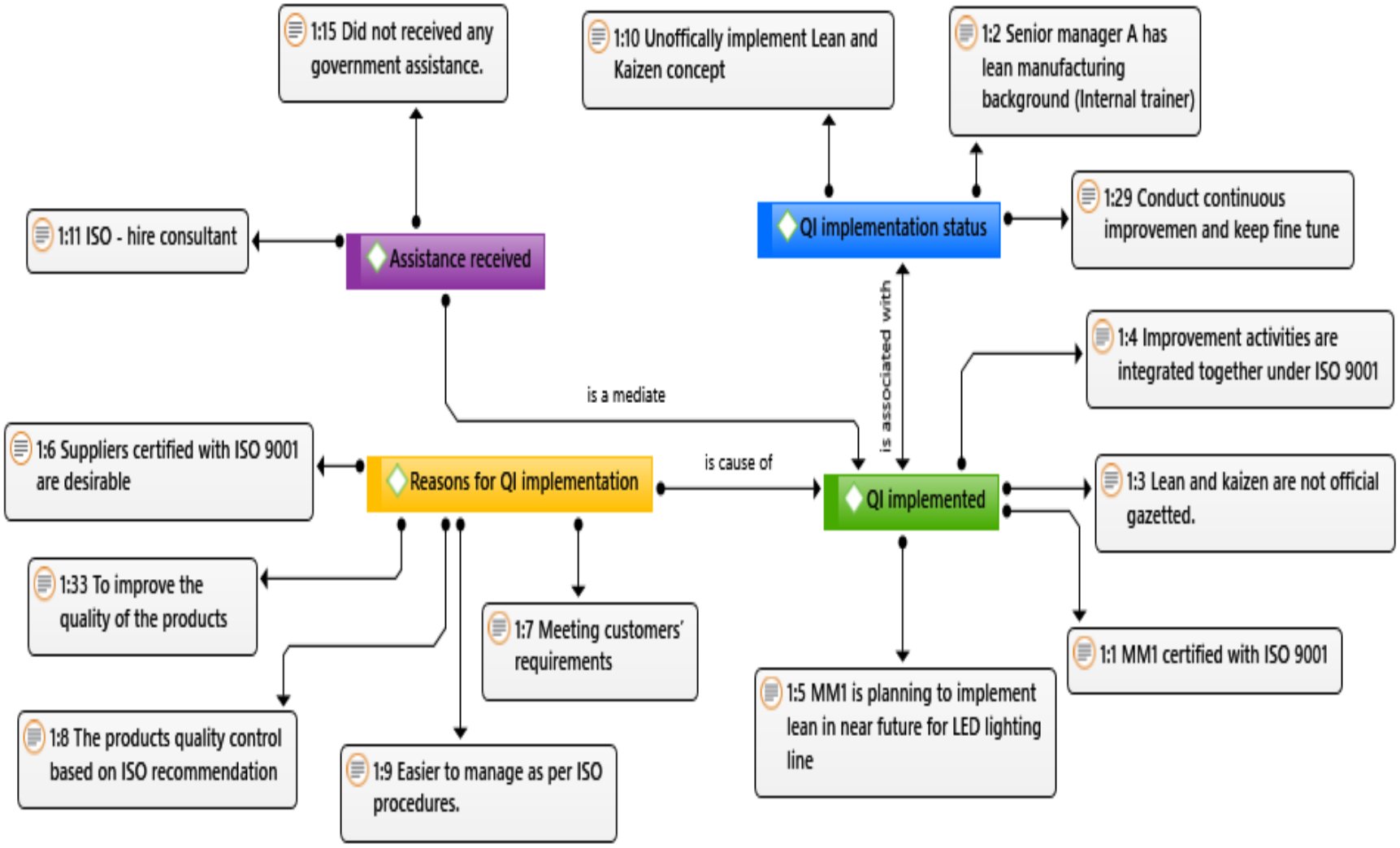
ML1

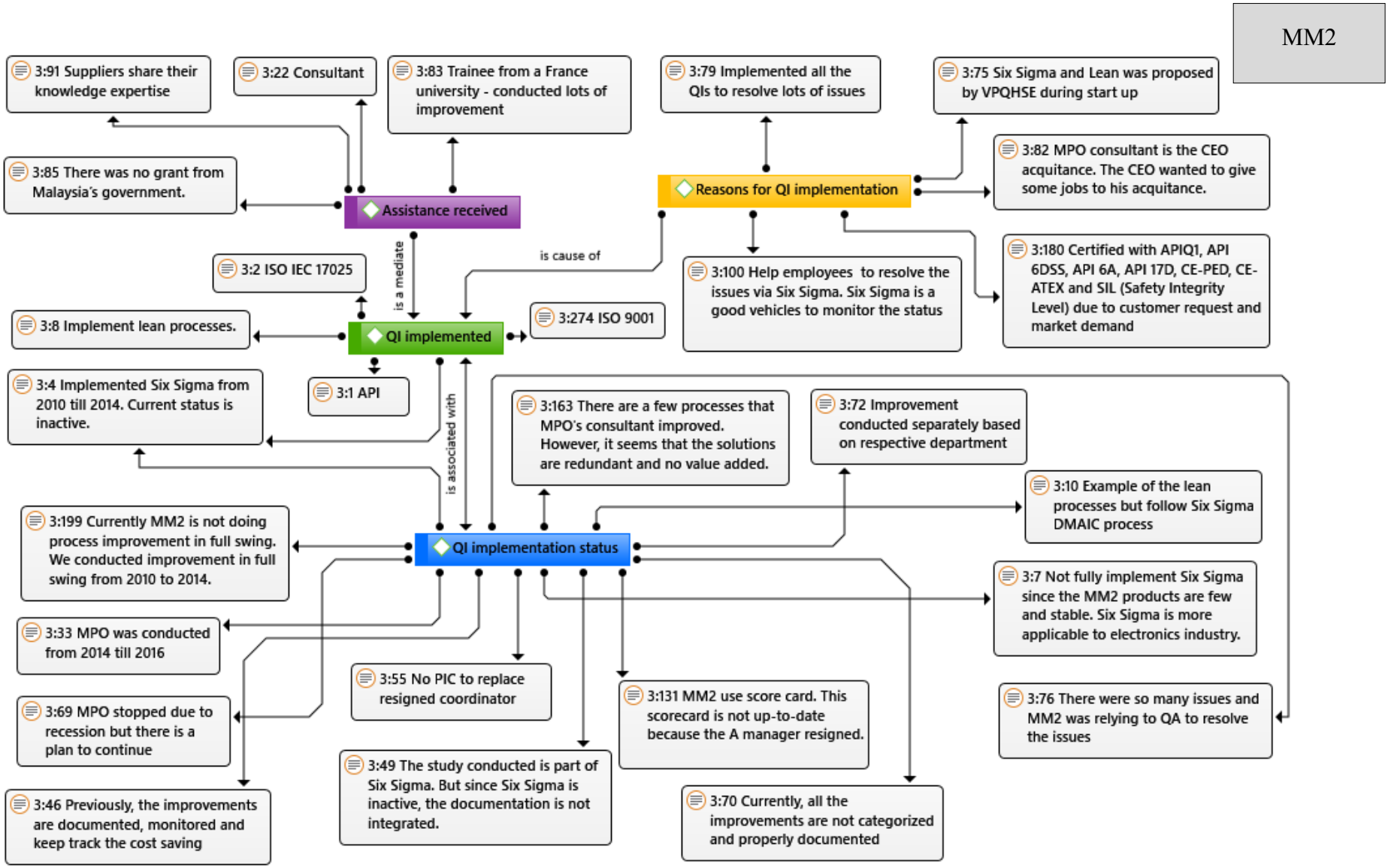

6:3 ML1 wants the management system in place for reference
6:2 ISO 9001 implementation was based on commercial needs
Reasons for QI implementation
6:1 Implement ISO 9001
6:6 The consultant assist to establish mapping and key structure.
6:7 ISO:9001 2015 version is 100% implemented by ML1
is cause of
QI implemented
6:4 ML1 hire a consultant during start up.
Assistance received
is a mediate
is associated with
QI implementation status
6:25 Collaborate with university
6:8 ML1 didn't receive any assistance from external resources except for hiring consultant
6:5 ML1 established the documentation (e.g. SOPs) , apply for accreditation and conduct education, management review etc.

ML2

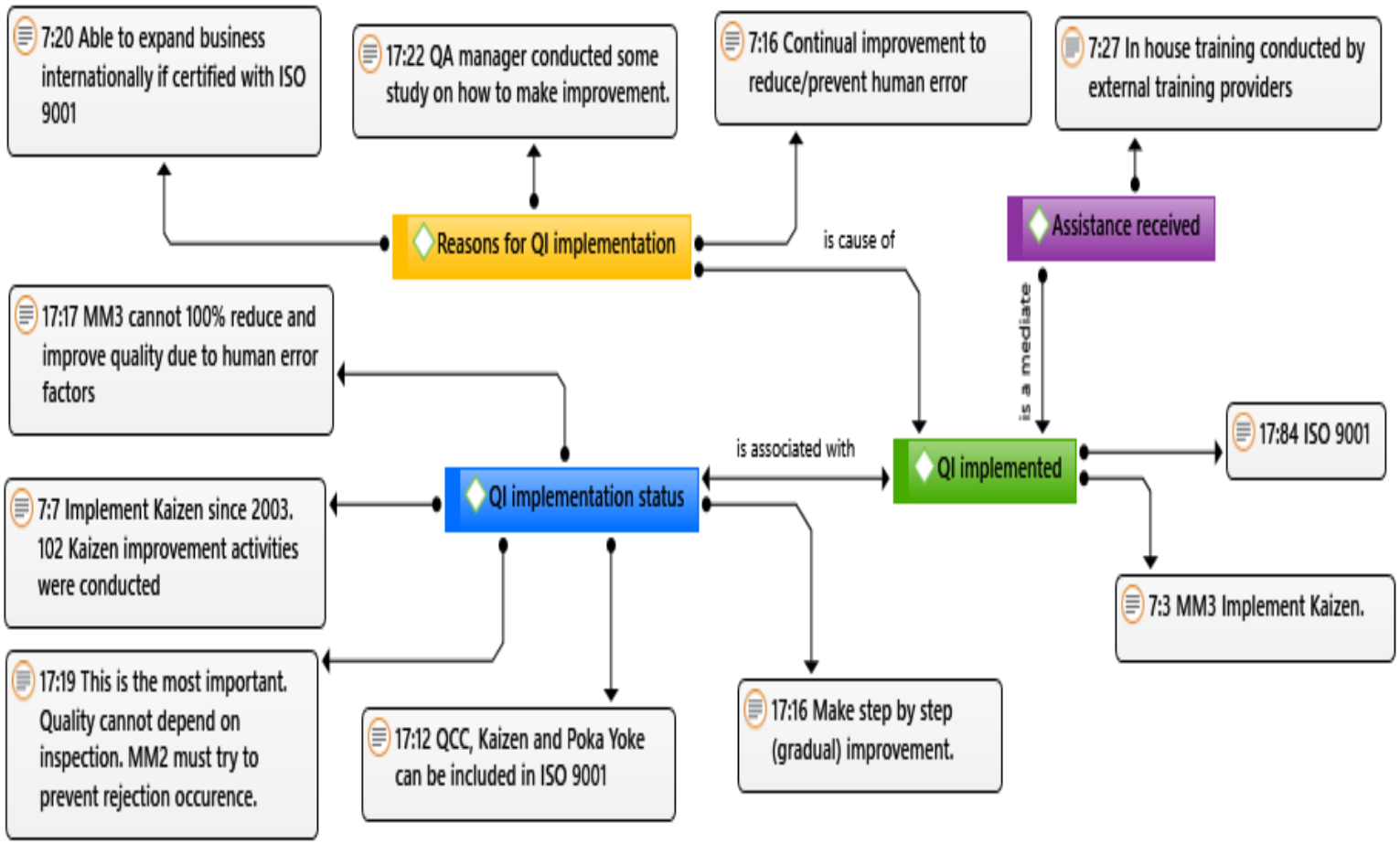

2:9 Conduct Six Sigma projects due to customer request.
2:68 To maintain quality objectives
2:36 Customers just instruct and didn't assist.
2:54 ML2 does not received other support.
2:29 Participated in QCC competition organized by MPC
2:21 Potential business
Assistance received
2:25 Six Sigma - utilize external trainer.
2:23 Certified with IATF 16949 to penetrate automotive business
Reasons for QI implementation
is cause of
2:43 MPC requested participation from companies and encouraged ML2 to implement QCC
2:53 Received HRDF fund for all the training conducted.
2:16 As for SGA, it was led by management.
2:45 Joined QCC competition to promote ML2 (marketing strategy)
is a mediate
QI implemented
2:22 Customers request for related standards compliance
2:2 Improvement team (small group activities)
is associated with
2:1 Previously, ML2 had Six Sigma program
2:28 Utilize external trainer for Six Sigma training because initially ML2 didn't know how to implement Six Sigma.
2:7 Six Sigma projects is inactive
2:74 There is no special improvement program. Conduct improvement on daily basis.
QI implementation status
2:41 Conducted Six Sigma program in 2014 and 2015
2:64 Currently, focus on cost saving projects instead of various projects area
2:63 Less SGA activities due to ML2 downsizing
2:27 SGA started implemented in 2000.
2:10 The QIs activities are less because there are few requests.
2:62 Currently, the number of groups is very less. Previously, ML2 had 6-10 groups

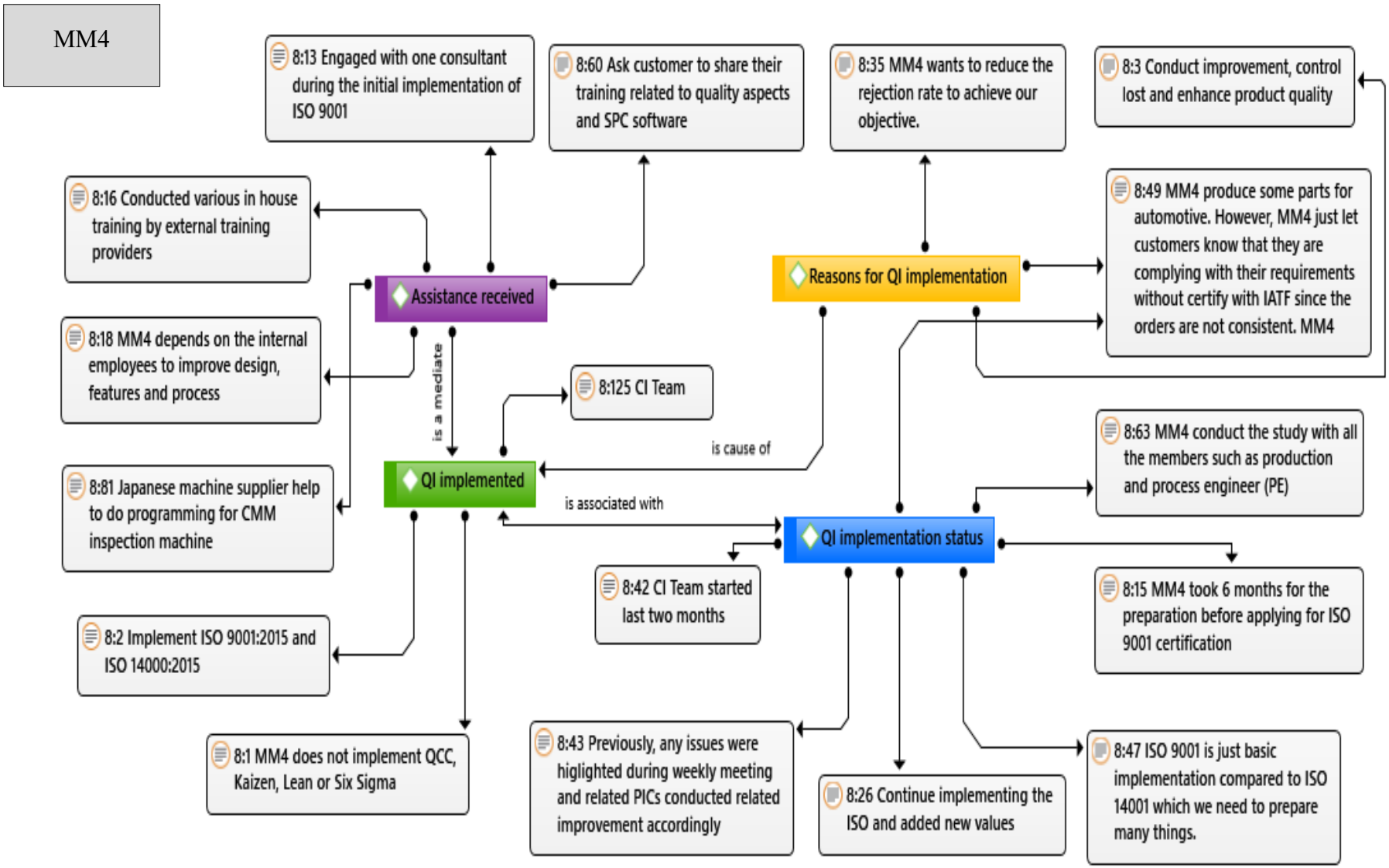
MM1

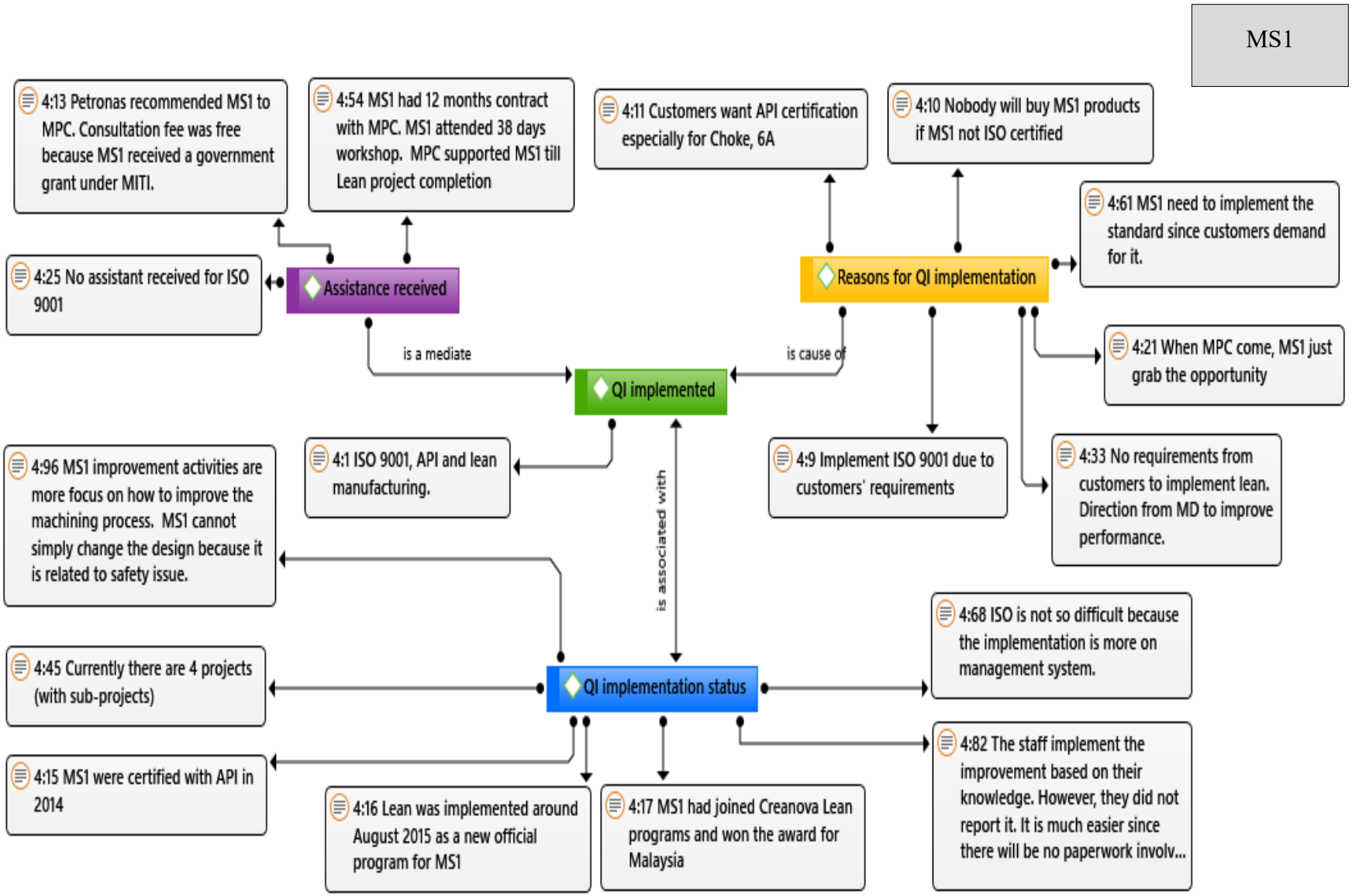

1:15 Did not received any government assistance.
1:10 Unoffically implement Lean and Kaizen concept
1:2 Senior manager A has lean manufacturing background (Internal trainer)
1:11 ISO - hire consultant
Assistance received
QI implementation status
1:29 Conduct continuous improvemen and keep fine tune
is associated with
1:4 Improvement activities are integrated together under ISO 9001
is a mediate
1:6 Suppliers certified with ISO 9001 are desirable
Reasons for QI implementation
is cause of
QI implemented
1:3 Lean and kaizen are not official gazetted.
1:33 To improve the quality of the products
1:7 Meeting customers' requirements
1:1 MM1 certified with ISO 9001
1:5 MM1 is planning to implement lean in near future for LED lighting line
1:8 The products quality control based on ISO recommendation
1:9 Easier to manage as per ISO procedures.

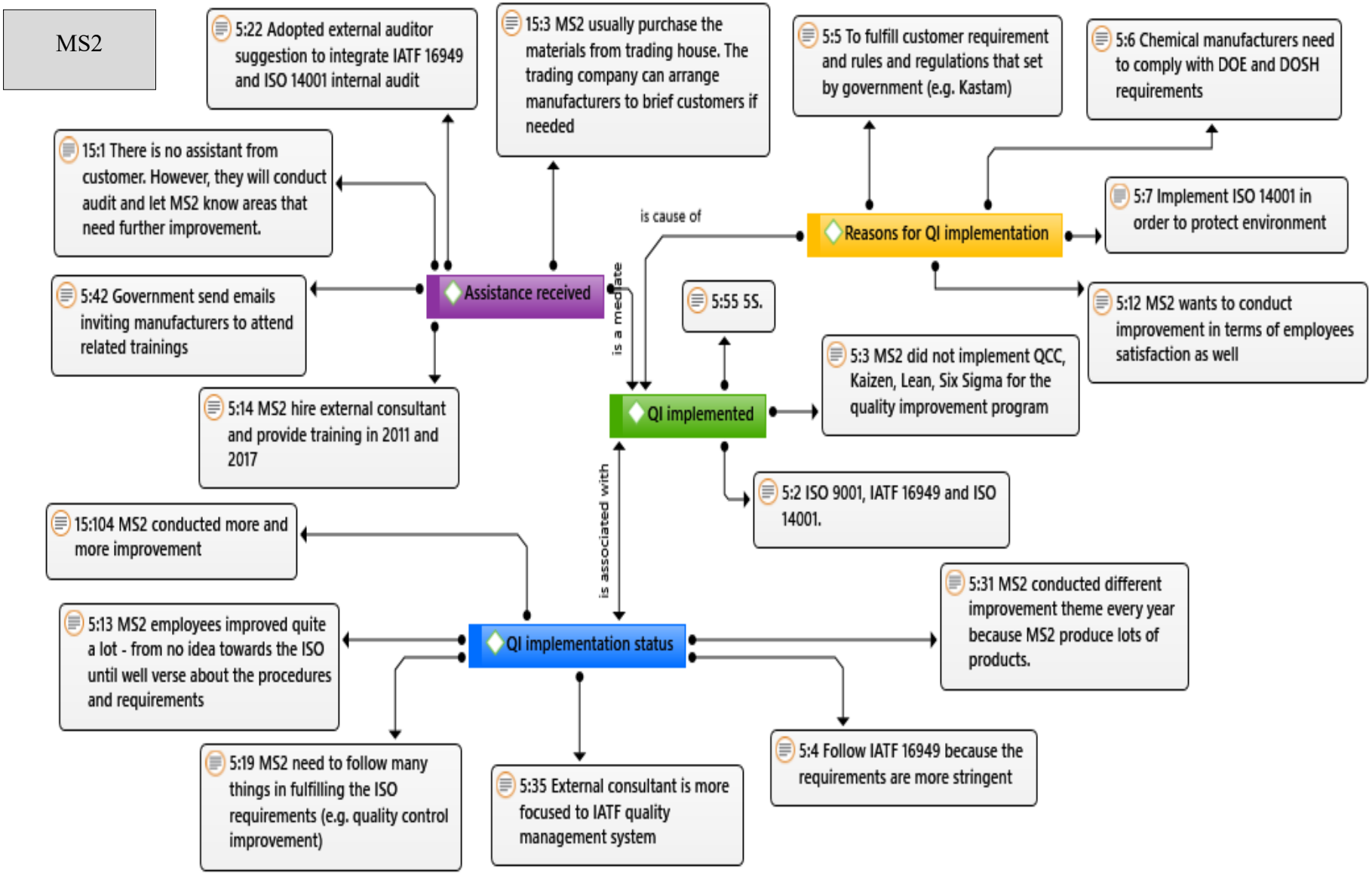

MM2
3:91 Suppliers share their knowledge expertise
3:22 Consultant
3:83 Trainee from a France university - conducted lots of improvement
3:79 Implemented all the QIs to resolve lots of issues
3:75 Six Sigma and Lean was proposed by VPQHSE during start up
3:85 There was no grant from Malaysia's government.
Assistance received
Reasons for QI implementation
3:82 MPO consultant is the CEO acquitance. The CEO wanted to give some jobs to his acquitance.
is a mediate
is cause of
3:2 ISO IEC 17025
3:100 Help employees to resolve the issues via Six Sigma. Six Sigma is a good vehicles to monitor the status
3:180 Certified with APIQ1, API 6DSS, API 6A, API 17D, CE-PED, CE-ATEX and SIL (Safety Integrity Level) due to customer request and market demand
3:8 Implement lean processes.
QI implemented
3:274 ISO 9001
3:4 Implemented Six Sigma from 2010 till 2014. Current status is inactive.
3:1 API
is associated with
3:163 There are a few processes that MPO's consultant improved. However, it seems that the solutions are redundant and no value added.
3:72 Improvement conducted separately based on respective department
3:10 Example of the lean processes but follow Six Sigma DMAIC process
3:199 Currently MM2 is not doing process improvement in full swing. We conducted improvement in full swing from 2010 to 2014.
QI implementation status
3:7 Not fully implement Six Sigma since the MM2 products are few and stable. Six Sigma is more applicable to electronics industry.
3:33 MPO was conducted from 2014 till 2016
3:55 No PIC to replace resigned coordinator
3:131 MM2 use score card. This scorecard is not up-to-date because the A manager resigned.
3:76 There were so many issues and MM2 was relying to QA to resolve the issues
3:69 MPO stopped due to recession but there is a plan to continue
3:49 The study conducted is part of Six Sigma. But since Six Sigma is inactive, the documentation is not integrated.
3:46 Previously, the improvements are documented, monitored and keep track the cost saving
3:70 Currently, all the improvements are not categorized and properly documented

MM3

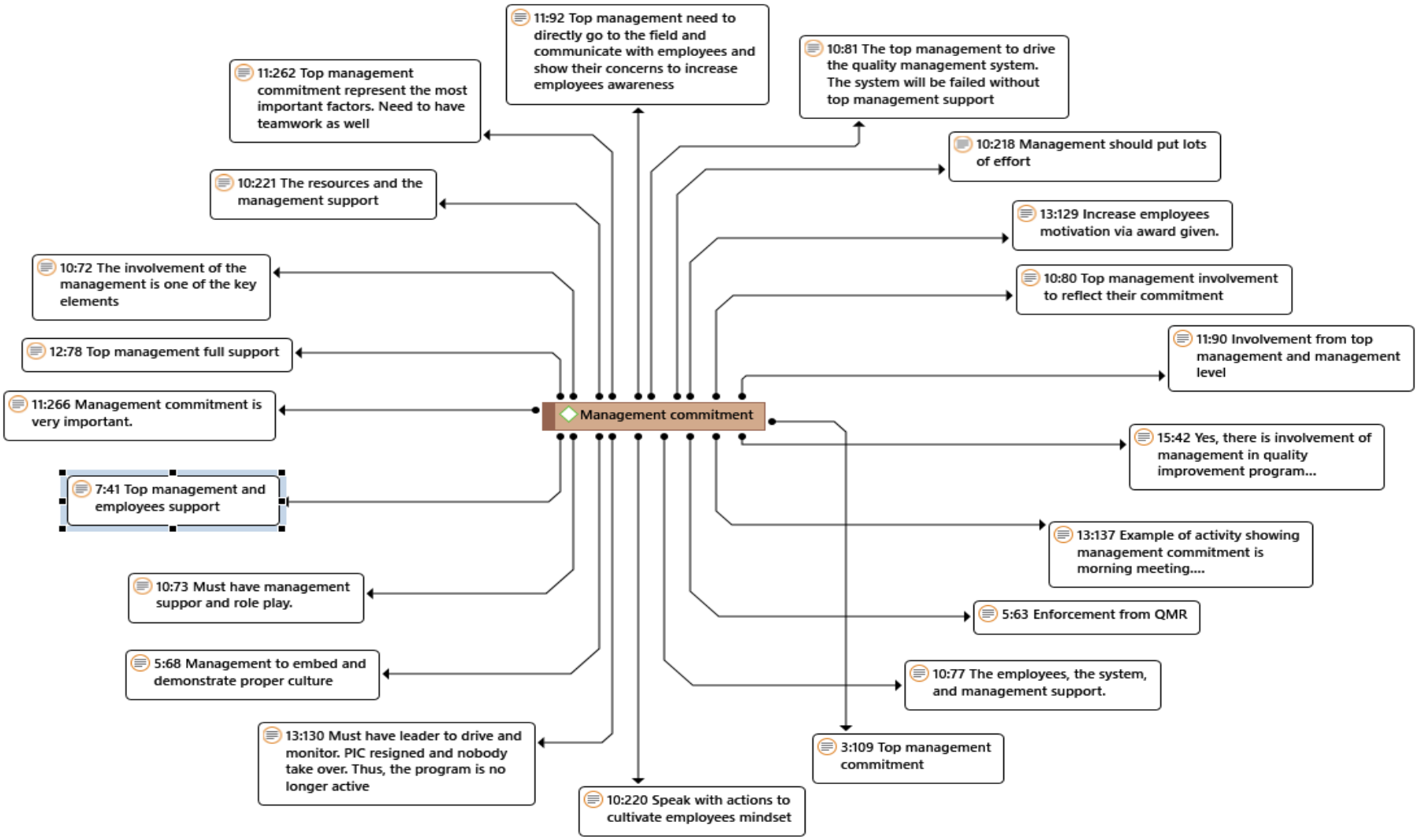

7:20 Able to expand business internationally if certified with ISO 9001
17:22 QA manager conducted some study on how to make improvement.
7:16 Continual improvement to reduce/prevent human error
7:27 In house training conducted by external training providers
Reasons for QI implementation
is cause of
Assistance received
is a mediate
17:17 MM3 cannot 100% reduce and improve quality due to human error factors
is associated with
QI implemented
17:84 ISO 9001
QI implementation status
7:7 Implement Kaizen since 2003. 102 Kaizen improvement activities were conducted
7:3 MM3 Implement Kaizen.
17:19 This is the most important. Quality cannot depend on inspection. MM2 must try to prevent rejection occurence.
17:12 QCC, Kaizen and Poka Yoke can be included in ISO 9001
17:16 Make step by step (gradual) improvement.

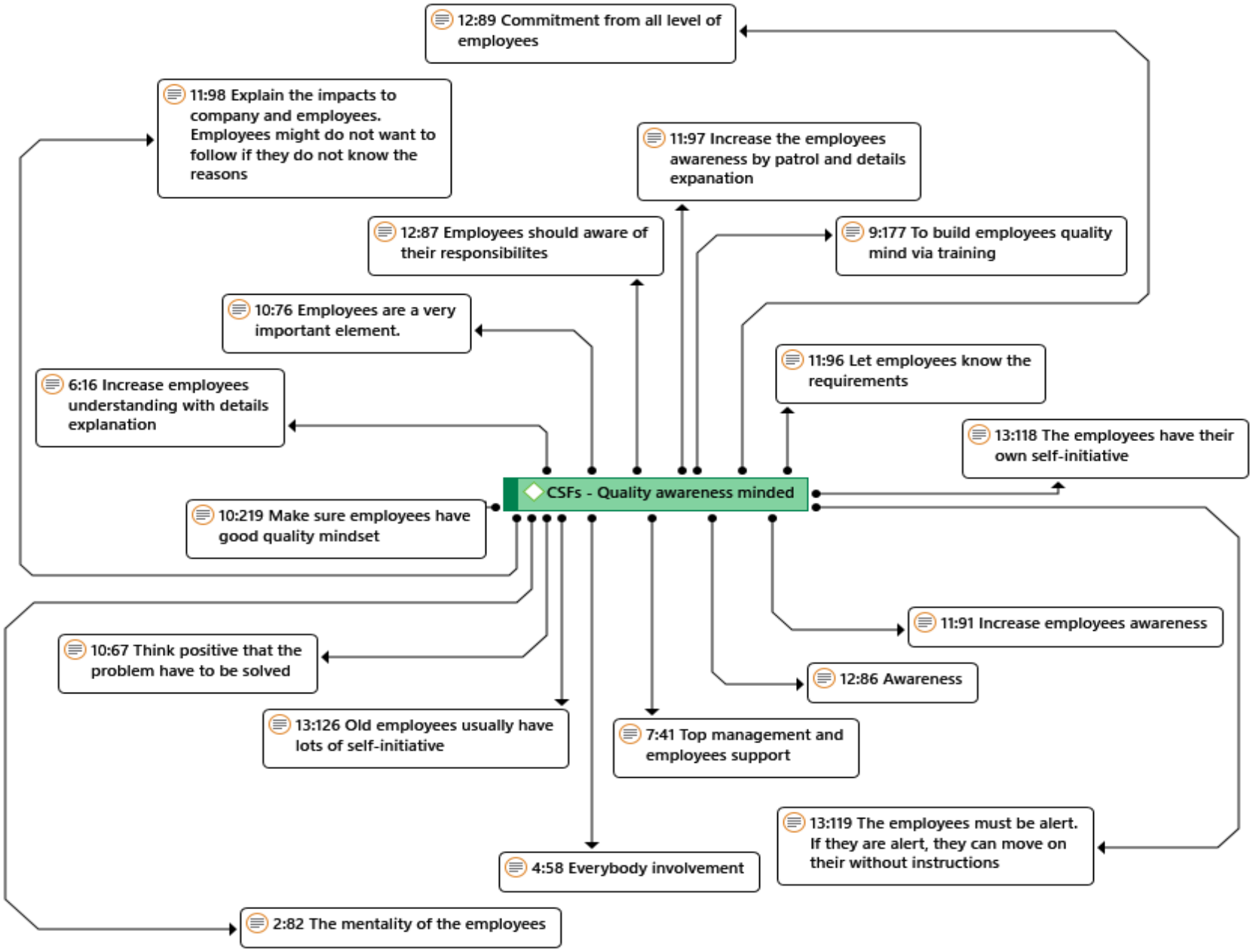

MM4
8:13 Engaged with one consultant during the initial implementation of ISO 9001
8:60 Ask customer to share their training related to quality aspects and SPC software
8:35 MM4 wants to reduce the rejection rate to achieve our objective.
8:3 Conduct improvement, control lost and enhance product quality
8:16 Conducted various in house training by external training providers
Assistance received
Reasons for QI implementation
8:49 MM4 produce some parts for automotive. However, MM4 just let customers know that they are complying with their requirements without certify with IATF since the orders are not consistent. MM4
8:18 MM4 depends on the internal employees to improve design, features and process
is a mediate
8:125 CI Team
is cause of
8:63 MM4 conduct the study with all the members such as production and process engineer (PE)
8:81 Japanese machine supplier help to do programming for CMM inspection machine
QI implemented
is associated with
QI implementation status
8:42 CI Team started last two months
8:15 MM4 took 6 months for the preparation before applying for ISO 9001 certification
8:2 Implement ISO 9001:2015 and ISO 14000:2015
8:1 MM4 does not implement QCC, Kaizen, Lean or Six Sigma
8:43 Previously, any issues were higlighted during weekly meeting and related PICs conducted related improvement accordingly
8:26 Continue implementing the ISO and added new values
8:47 ISO 9001 is just basic implementation compared to ISO 14001 which we need to prepare many things.

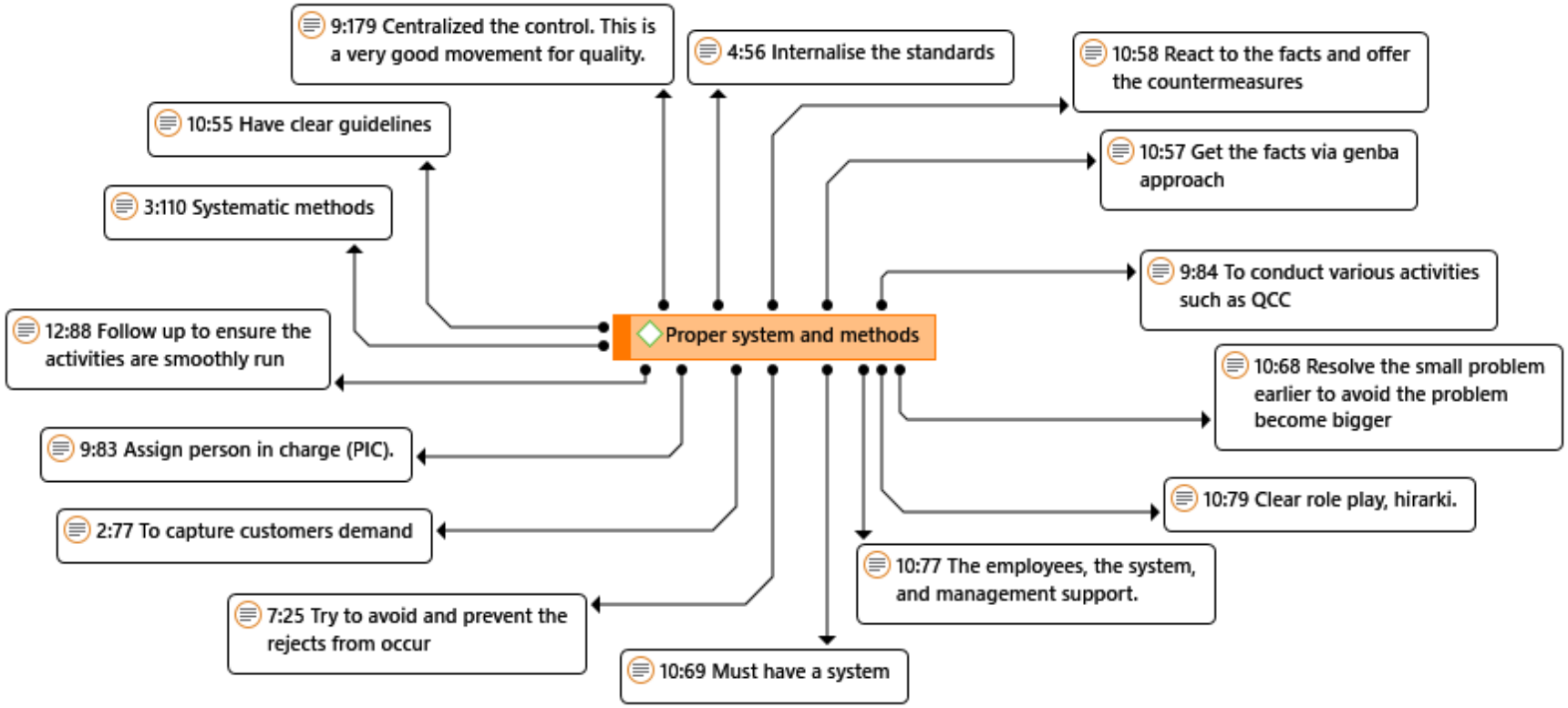

MS1
4:13 Petronas recommended MS1 to MPC. Consultation fee was free because MS1 received a government grant under MITI.
4:54 MS1 had 12 months contract with MPC. MS1 attended 38 days workshop. MPC supported MS1 till Lean project completion
4:11 Customers want API certification especially for Choke, 6A
4:10 Nobody will buy MS1 products if MS1 not ISO certified
4:61 MS1 need to implement the standard since customers demand for it.
4:25 No assistant received for ISO 9001
Assistance received
Reasons for QI implementation
is a mediate
is cause of
QI implemented
4:21 When MPC come, MS1 just grab the opportunity
4:96 MS1 improvement activities are more focus on how to improve the machining process. MS1 cannot simply change the design because it is related to safety issue.
4:1 ISO 9001, API and lean manufacturing.
4:9 Implement ISO 9001 due to customers' requirements
4:33 No requirements from customers to implement lean. Direction from MD to improve performance.
is associated with
4:68 ISO is not so difficult because the implementation is more on management system.
4:45 Currently there are 4 projects (with sub-projects)
QI implementation status
4:82 The staff implement the improvement based on their knowledge. However, they did not report it. It is much easier since there will be no paperwork involv...
4:15 MS1 were certified with API in 2014
4:16 Lean was implemented around August 2015 as a new official program for MS1
4:17 MS1 had joined Creanova Lean programs and won the award for Malaysia

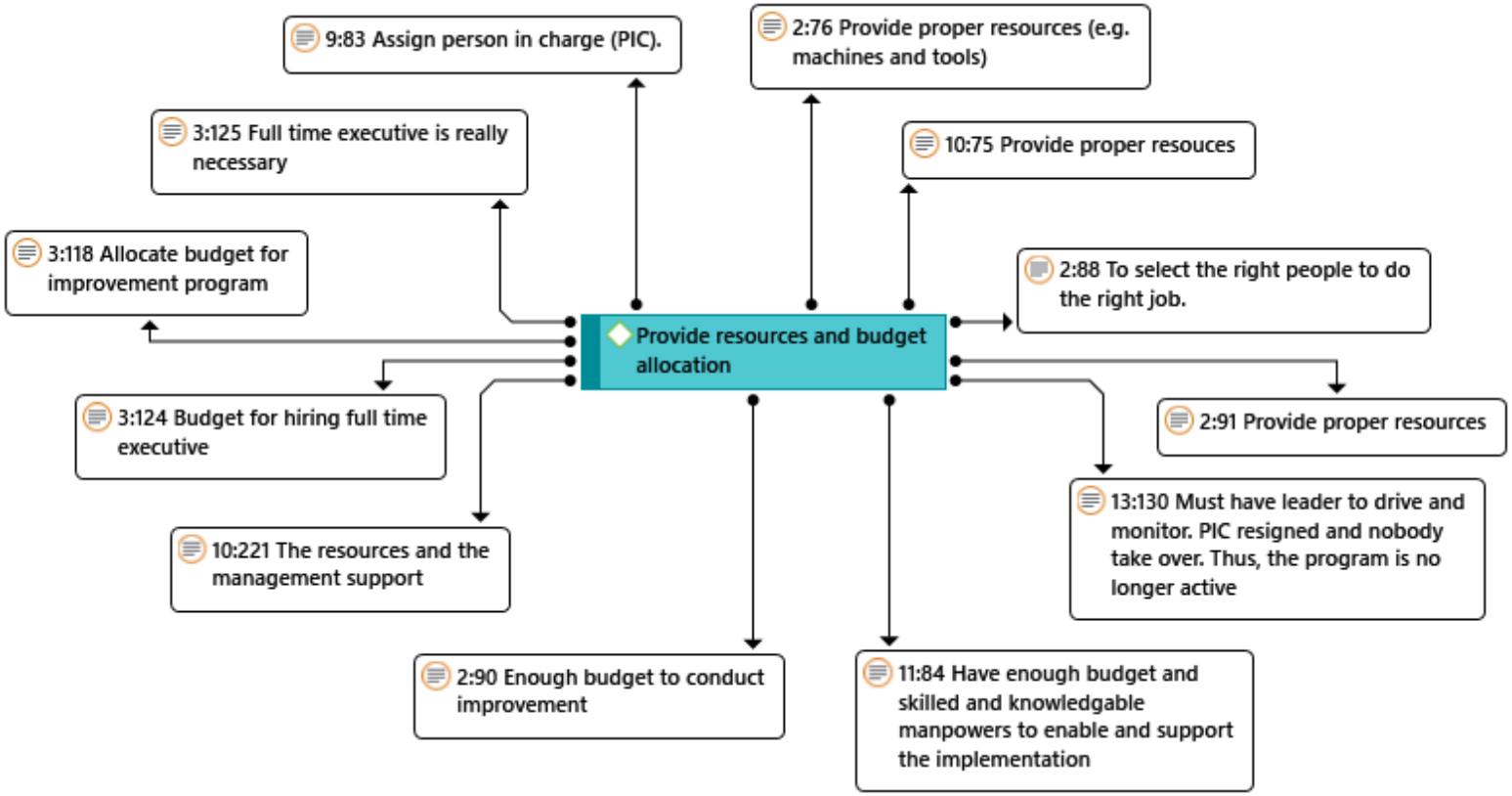

MS2
5:22 Adopted external auditor suggestion to integrate IATF 16949 and ISO 14001 internal audit
15:3 MS2 usually purchase the materials from trading house. The trading company can arrange manufacturers to brief customers if needed
5:5 To fulfill customer requirement and rules and regulations that set by government (e.g. Kastam)
5:6 Chemical manufacturers need to comply with DOE and DOSH requirements
15:1 There is no assistant from customer. However, they will conduct audit and let MS2 know areas that need further improvement.
is cause of
Reasons for QI implementation
5:7 Implement ISO 14001 in order to protect environment
5:42 Government send emails inviting manufacturers to attend related trainings
Assistance received
is a mediate
5:55 5S.
5:12 MS2 wants to conduct improvement in terms of employees satisfaction as well
5:3 MS2 did not implement QCC, Kaizen, Lean, Six Sigma for the quality improvement program
5:14 MS2 hire external consultant and provide training in 2011 and 2017
QI implemented
5:2 ISO 9001, IATF 16949 and ISO 14001.
is associated with
15:104 MS2 conducted more and more improvement
5:31 MS2 conducted different improvement theme every year because MS2 produce lots of products.
5:13 MS2 employees improved quite a lot - from no idea towards the ISO until well verse about the procedures and requirements
QI implementation status
5:19 MS2 need to follow many things in fulfilling the ISO requirements (e.g. quality control improvement)
5:35 External consultant is more focused to IATF quality management system
5:4 Follow IATF 16949 because the requirements are more stringent

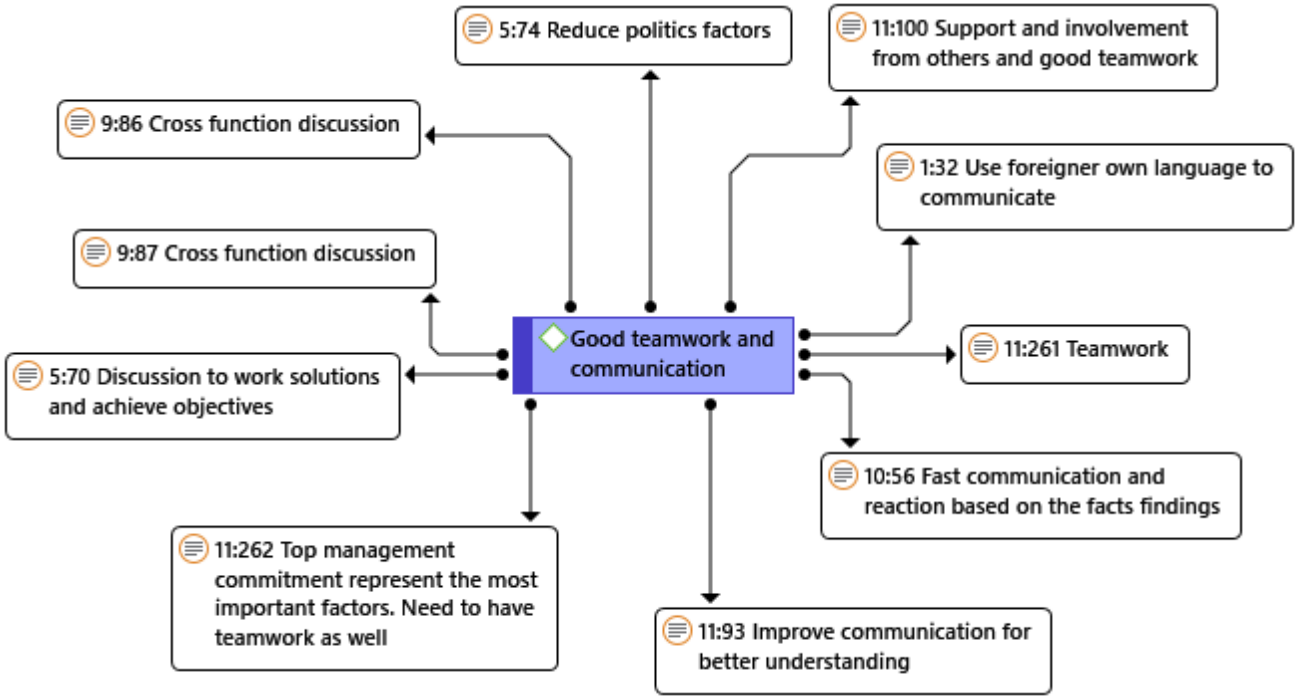
Appendix V: Important Factors (extracted from Atlas.ti)

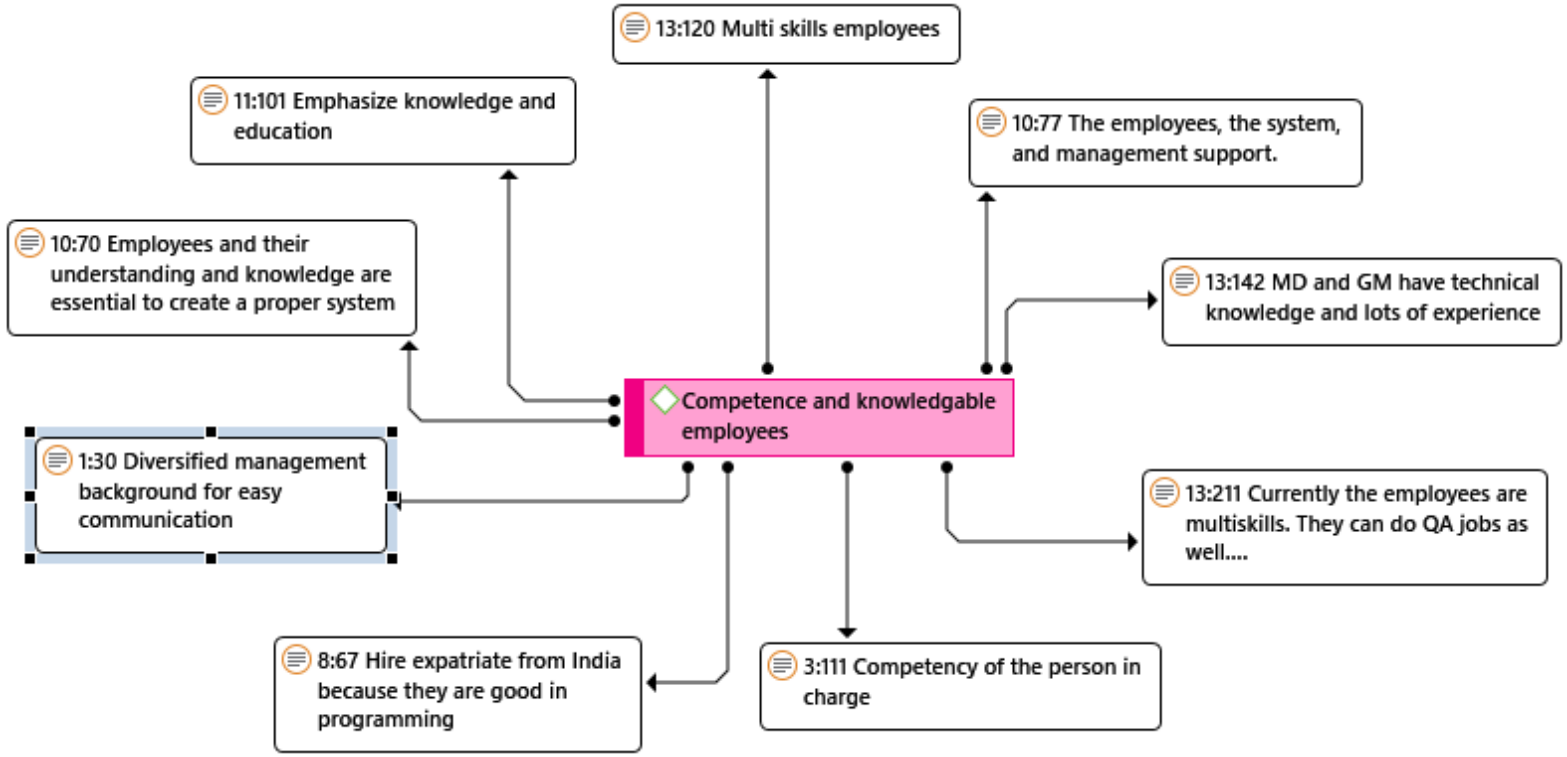


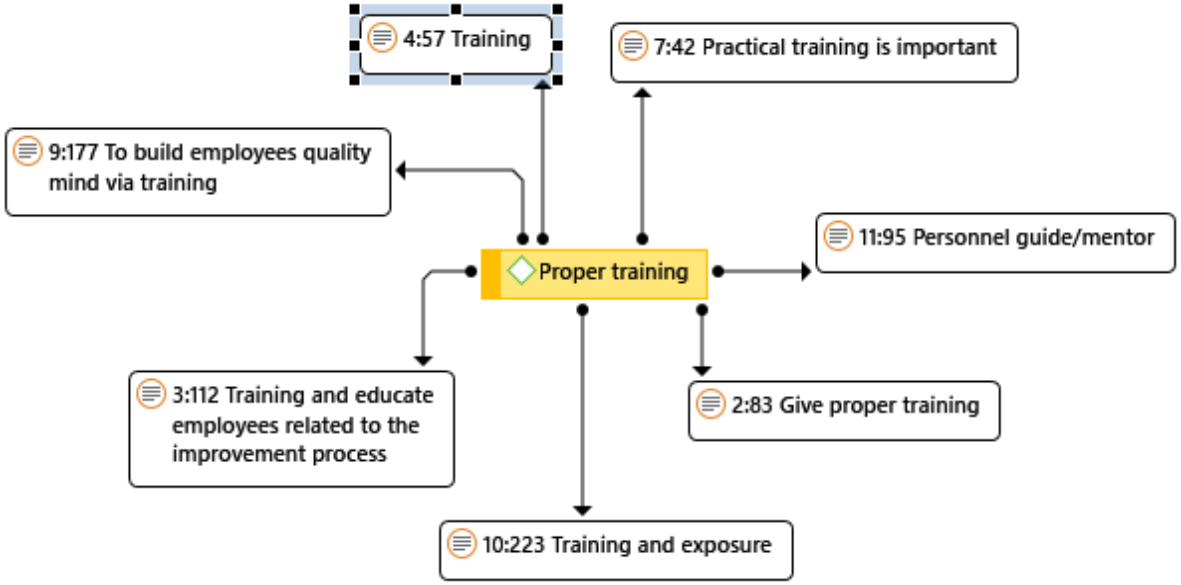

12:89 Commitment from all level of employees
11:98 Explain the impacts to company and employees. Employees might do not want to follow if they do not know the reasons
11:97 Increase the employees awareness by patrol and details expanation
12:87 Employees should aware of their responsibilites
9:177 To build employees quality mind via training
10:76 Employees are a very important element.
11:96 Let employees know the requirements
6:16 Increase employees understanding with details explanation
13:118 The employees have their own self-initiative
CSFs - Quality awareness minded
10:219 Make sure employees have good quality mindset
11:91 Increase employees awareness
10:67 Think positive that the problem have to be solved
12:86 Awareness
13:126 Old employees usually have lots of self-initiative
7:41 Top management and employees support
13:119 The employees must be alert. If they are alert, they can move on their without instructions
4:58 Everybody involvement
2:82 The mentality of the employees


9:179 Centralized the control. This is a very good movement for quality.
4:56 Internalise the standards
10:58 React to the facts and offer the countermeasures
10:55 Have clear guidelines
10:57 Get the facts via genba approach
3:110 Systematic methods
9:84 To conduct various activities such as QCC
12:88 Follow up to ensure the activities are smoothly run
Proper system and methods
10:68 Resolve the small problem earlier to avoid the problem become bigger
9:83 Assign person in charge (PIC).
10:79 Clear role play, hirarki.
2:77 To capture customers demand
10:77 The employees, the system, and management support.
7:25 Try to avoid and prevent the rejects from occur
10:69 Must have a system


9:83 Assign person in charge (PIC).
2:76 Provide proper resources (e.g. machines and tools)
3:125 Full time executive is really necessary
10:75 Provide proper resouces
3:118 Allocate budget for improvement program
2:88 To select the right people to do the right job.
Provide resources and budget allocation
3:124 Budget for hiring full time executive
2:91 Provide proper resources
13:130 Must have leader to drive and monitor. PIC resigned and nobody take over. Thus, the program is no longer active
10:221 The resources and the management support
2:90 Enough budget to conduct improvement
11:84 Have enough budget and skilled and knowledgable manpowers to enable and support the implementation


5:74 Reduce politics factors
11:100 Support and involvement from others and good teamwork
9:86 Cross function discussion
1:32 Use foreigner own language to communicate
9:87 Cross function discussion
Good teamwork and communication
11:261 Teamwork
5:70 Discussion to work solutions and achieve objectives
10:56 Fast communication and reaction based on the facts findings
11:262 Top management commitment represent the most important factors. Need to have teamwork as well
11:93 Improve communication for better understanding


13:120 Multi skills employees
11:101 Emphasize knowledge and education
10:77 The employees, the system, and management support.
10:70 Employees and their understanding and knowledge are essential to create a proper system
13:142 MD and GM have technical knowledge and lots of experience
Competence and knowledgable employees
1:30 Diversified management background for easy communication
13:211 Currently the employees are multiskills. They can do QA jobs as well....
8:67 Hire expatriate from India because they are good in programming
3:111 Competency of the person in charge


4:57 Training
7:42 Practical training is important
9:177 To build employees quality mind via training
Proper training
11:95 Personnel guide/mentor
3:112 Training and educate employees related to the improvement process
2:83 Give proper training
10:223 Training and exposure