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Quality Management Practices of Food Manufacturers: A Comparative Study between Small, Medium and Large Companies in Malaysia

Ng Kim-Soon [1,*], Salama A. Mostafa [2,*], Mohammad Nurunnabi [3,*], Lim Hui Chin [1], Nallapaneni Manoj Kumar [4,5,*], Rabei Raad Ali [2] and Umashankar Subramaniam [6]

1 Faculty of Technology Management and Business, University Tun Hussein Onn Malaysia, Johor 86400, Malaysia; hclim90@gmail.com
2 Faculty of Computer Science and Information Technology, University Tun Hussein Onn Malaysia, Johor 86400, Malaysia; rabei.aljawary@gmail.com
3 Business, Society and Environment Lab (BSE), College of Business Administration, Prince Sultan University, Riyadh 11586, Saudi Arabia
4 School of Energy and Environment, City University of Hong Kong, Kowloon, Hong Kong
5 Sustainable Solutionz, T Nagar, Chennai 600017, Tamil Nadu, India
6 Renewable Energy Laboratory, College of Engineering, Prince Sultan University, Riyadh 11586, Saudi Arabia; usubramaniam@psu.edu.sa
* Correspondence: ngksoon@gmail.com (N.K.-S.); salama@uthm.edu.my (S.A.M.); mnurunnabi@psu.edu.sa (M.N.); mnallapan2-c@my.cityu.edu.hk (N.M.K.)

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Abstract: Quality management (QM) has been intensively studied from the perspective of quality management practices (QMP) and market performance in the food manufacturing industry. However, in Asian countries, studies as regards to the sizes of food manufacturing companies are being neglected. Hence, this quantitative study investigates several aspects and focuses on the extent and level of QMP implementation among small, medium, and large food manufacturing companies in Malaysia. A survey questionnaire has been used to collect the data. In general, the results show that the components and types of QMP have the highest impact on large companies and medium companies than the smallest companies. It was found that QMP significantly related to the operational performance and market performance of the food manufacturing companies in Malaysia. Moreover, the verified QMP was particularly important to improve the effectiveness of resource control of small-sized and medium-sized enterprises. The outcome of this study serves as a framework to bring an understanding of QMP and promote continuous QM improvement means to the food manufacturing industries in Malaysia and other countries of the region.

Keywords: quality management (QM); quality management practices (QMP); international organization for standardization (IOS); good manufacturing practices (GMP); hazard analysis critical control points (HACCP)

1. Introduction

Over the past few decades, the food manufacturing industry has experienced substantial global growth. Several similar studies have been conducted in some advanced countries like the United States of America and Canada that bring some interesting statistics and measures for the development of food manufacturing industries all over the world. Zhang [1] reported that more than 10% was recorded by the United States food manufacturing industry from the total shipment value of 538 billion dollars in the manufacturing sector in 2006. It was identified that this manufacturing industry

dominated the whole manufacturing sector in the United States, within 28,000 companies involved in the sector. Another example is the Canadian food manufacturing industry, which is the second-largest manufacturing sector, accounting for more than 88 billion dollars in revenue in 2012 [2]. Malaysia is considered as a good candidate for studying the quality management practices (QMP) of food manufacturing companies in the Asia Pacific region. Firstly, it has increasing positive growth in the processed food market that includes large, medium, and smallest food manufacturing companies. Secondly, Malaysia is a member of the World Trade Organization (WTO) and strategically ranked as the second trading partner within Asia and the 23rd largest trading partner within the European Union (EU) [3]. Thirdly, it is the third-largest poultry meat producer in the Asia Pacific region, the largest cocoa processor in Asia, and the sixth-largest exporter in the world for pepper and its related products and especially [4]. Hence, the food manufacturing industry shows a significant contribution to Malaysia's economy. The five main processed foods exported from Malaysia are summarized in Table 1.

Table 1. Main processed food exported from Malaysia in 2015.

Processed Food Exported	Exporting Value (RM)
Edible products and preparation	5.6 billion
Cocoa and cocoa preparations	4.1 billion
Cereal and cereal preparation	2.8 billion
Dairy products	1.4 billion
Margarine and shortening	1.1 billion

Source: Malaysian Investment Development Authority, Food Technology, and Sustainable. Available online: http://www.mida.gov.my/home/food-technology-and-sustainable-resources/posts/ (accessed on 2 August 2016).

Quality management practices (QMP) can be extracted from quality systems such as the good manufacturing practices (GMP) for food, the good hygiene practices (GHP), hazard analysis critical control points (HACCP) system, the international organization for standardization (ISO) 9001 and the total quality management (TQM) program [5–9]. For example, the ISO 9001 system emphasized customer focus, leadership, the involvement of people, process approach, system approach to management, continual improvement, factual approach to decision making, and mutually beneficial supplier relationships [10]. All these systems have been practiced and implemented worldwide [7,8].

In Malaysia, quality systems were first launched in 1987. The earliest system introduced was the ISO standard [11]. Up to 2014, there was a total of 11,487 companies in Malaysia with ISO 9001 standard certification and 311 companies certified with the ISO 22000 system [12]. Besides the ISO system, other quality systems, including the HACCP, GMP, and Halal assurance system (HAS), are widely implemented by food manufacturing companies in Malaysia [11]. The QMP is not only important to assure the product quality of an organization but also to enhance the performance of the organization [5]. However, companies of different sizes are believed to implement QMP with distinction [13]. Small and medium-sized companies have more limitations as compared to the larger-sized companies concerning the implementation of an effective and efficient QMP, and this is due to the limitations of the resources and the shortage in the QMP related processes [5].

Over the years, extensive studies had been conducted on quality assurance (QA) and QM models for the respective small-medium enterprises (SMEs) and large-scale companies. However, there are limited studies reported in the food-related field, particularly in Malaysia. QMP studies are usually adapted from one of the QM systems. A limited number of studies were identified for the QMP based on HACCP and GMP. However, previous literature did not emphasize specifically the food manufacturing industry; instead, prior works were mainly focused on the manufacturing industry on a general basis [13,14].

This study focuses on investigating the QMP within the operational performance and market performance of Malaysian food manufacturing companies. The study aims to determine the extent and level of QMP implementation among small, medium, and large companies. It outcomes a framework

that brings an understanding of QMP and promotes continuous QM improvement means to the food manufacturing industries in Malaysia and other countries of the Asia Pacific region.

This section introduces the research scope, research problem, and presents the contribution of the study. The rest of the paper is organized into four sections as follows: Section 2 presents the literature review. Section 3 describes the methods and materials that are required for conducting this work. Section 4 reports the analysis of the results and the findings of the research. Finally, Section 5 presents the conclusions and future work.

2. Related Work

Over the years, extensive studies have been conducted to correlate the relationship between QMP with the performance of companies. Several approaches were used during the development of QMP. These included: (1) theory contribution from quality gurus, (2) quality award evaluation model, and (3) measurement studies [15]. The participation of quality gurus such as [16–20] greatly influenced today's researches. Recent research regarding the ISO 9001 certified and non-certified companies with their financial and non-financial performance was conducted. The performance indicator used included customer satisfaction, product quality, financial performance, operational performance, and market performance. Psomas and Kafetzopoulos [7] discovered that the ISO 9001 certified companies had better performance compared to the non-certified companies, particularly in terms of the product quality and operational performance. This is because the ISO 9001 is a process-oriented system; thus, it significantly improves the performance of ISO certified companies. The consistency in product quality caused improvement in customer satisfaction and indirectly affecting the market share in a positive manner.

Saraph et al. [21] were among the first to conduct the empirical study for TQM. Based on extensive literature review and feedback from the participated companies, Saraph and co-workers successfully developed eight TQMs. Flynn [22] also conducted relatively significant research on QMP. They focused on the manufacturing industries and successfully developed eight measurable practices. The above frameworks serve as the foundation for the recent QMP and had been adapted widely for empirical work. These practices were being adapted as well during the development of the quality awards framework, such as the Malcolm Baldrige Quality Award (MBQA) framework [23]. However, the application results of such frameworks were inconsistent as positive effects [24], no effect [25], and adverse effects [26] were reported.

Talib et al. [27] studied the model of QMP in Malaysian food manufacturing companies. The study's main focus was on the QMP of SMEs via the TQM program, where eight dimensions were identified for assessing the QMP. They were: (1) quality assurance, (2) leadership, (3) information management, (4) customer focus, (5) human resource management, (6) process management, (7) supplier focus, and (8) corporate planning. However, Talib et al. [27] suggested that further research is required to identify the QMP of organizational performance.

Sohail and Teo [28] studied the effects of TQM on the organizational performances of the Malaysian SMEs. They compared between the ISO 9000 certified and non-certified companies based on six criteria: (1) employee training and development, (2) process management, (3) quality measurement and benchmarking, (4) top management commitment, (5) customer involvement and satisfaction, and (6) strategy and planning. They found a significant relationship between TQM with the organizational performance of SMEs. However, it was not specifically designed for the food manufacturing industries, and it concentrated on various industries sectors. In addition, the respondents were randomly selected from the SMEs membership list without considering the types of industry. This study focused solely on the SMEs in Malaysia, where the large companies were not included.

Anuar and Yusuff [29] demonstrated the best quality manufacturing practices among Malaysian SMEs. The eight areas of best quality manufacturing practices consist of: (1) customer focus, (2) supply chain management, (3) production process, (4) quality, (5) marketing strategy, (6) technology and product innovation, (7) human resource development and (8) management. However, this study is limited to the ISO 9000 certified companies with a bias towards the manufacturing practices. The relationship between the performances of the selected companies was not discussed.

Abusa and Gibson [13] studied the implementation extent of a TQM program. They evaluated the implementation effect of ISO 9001 on the Libyan's manufacturing companies. The population focus was on small, medium, and large companies from various industries. This included food, minerals, electronics, chemical, textiles, furniture, cement, and building materials. Libyan companies were found to be struggling with implementing effective TQM programs. As this study was limited to the Libyan's companies, it may not match the economic context of Malaysia. Besides, it covered various industry types, and the findings show no statistical difference in the extent of TQM implementation between the small, medium, and large companies. However, they reported no significant difference between the ISO certified and non-certified companies [13].

Researchers had studied the QMP with an emphasis in terms of the TQM program, ISO 9001, and HACCP [27,30,31]. The implementation level of these practices was investigated among various industries in different countries using the quantitative approach [32]. The common QMP components examined are leadership, human resources, customer focus, supplier focus, process management, and quality assurance. The relationship between the QMP and the performance of the companies was investigated. The companies' performance measure includes organizational performance, competitive performance, quality performance and etc. The QMP were found having different implementation level among various industries [15,27]. Contrast findings were concluded for the relationship between QMP and company performance in which some researchers identified several positive relationships. Findings of the relationship between QMP and company performance appeared to be encouraging in which certain QMP was discovered to be significantly linked with companies' performance. This relationship in the context of food manufacturing companies shall be studied in this research. Table 2 summarized the previous literature on QMP.

Table 2. Summary of the previous studies on QMP.

Author	Variables	Location of Samples	Results
Talib et al. [27]	Model for QMP assessment	270 SMEs Malaysian food processing industry	QM framework was established based on the relationship between TQM and organization performance. The framework consists of (i) leadership, (ii) corporate planning, (iii) human resource management, (iv) customer focus, (v) supplier focus, (vi) information management, (vii) process management and (viii) quality assurance.
Abusa & Gibson [13]	Extent of TQM adoption and its impact on organizational performance.	Libyan companies	Each TQM element was significantly correlated with organizational performance with the exception in the supplier quality management. No significant differences in the ISO certified and non-certified company.
Anuar, & Yusuff [29]	The best manufacturing practices of Malaysian SMEs with ISO 9000 certification	270 Malaysia manufacturing SMEs with ISO 9000 certification	Eight dimensions of good practices were identified. The implementation level, from high to low were: customer focus, quality, management, supply chain management, human resource development, marketing strategy, production process, and lastly the technology and product innovation.
Psomas and Kafetzopoulos [7]	TQM practices and their effects	92 Greek food companies with ISO 9001:2000 and ELOT 1416	TQM practices affect company performance. Quality improvement was found affecting the customer satisfaction which is the derivative for market benefits.
Sohail & Teo [28]	Comparative study on the effect of TQM practices in organizational performance	80 Malaysia SMEs companies	Significant different observed between the ISO 9001 certified and non-ISO 9001 certified companies in which the ISO certified companies were found performing better.

3. Methods and Materials

This study is anchored on the theory of Competitive Advantage Barney, [33], Industrial-Organizational theory, and Resource-Based View (RBV) [34]. QMP is not only important to assure the product quality of an organization but also to enhance the performance of the organization [5]. However, companies of different sizes are believed to implement QMP with distinction [13]. Small and medium-sized companies have more limitations as compared to the larger-sized companies concerning the implementation of an effective and efficient QMP, and this is due to the limitations of the resources and the shortage in the QMP related processes [5]. This comparative study between small, medium and large companies determines the extent and level of QMP implementation among these different sizes of companies. Hence, the underpinning RBV aids in comprehending on how well the deployment of QMP optimizes the organizational performance in achieving successful performance for the different sizes of firms. The research framework proposed for this study is presented in Figure 1. The independent variable is the QMP, covering (i) leadership, (ii) customer focus, (iii) employee management, (iv) supplier management, (v) process management, (vi) quality control, and (vii) continuous improvement. Companies' performance is the dependent variable. It includes both operational performance and market performance. Subsequently, the research design, population, sample, and sampling method, including the questionnaire design, data collection process, and the statistical tools for data analysis, are presented in this section.

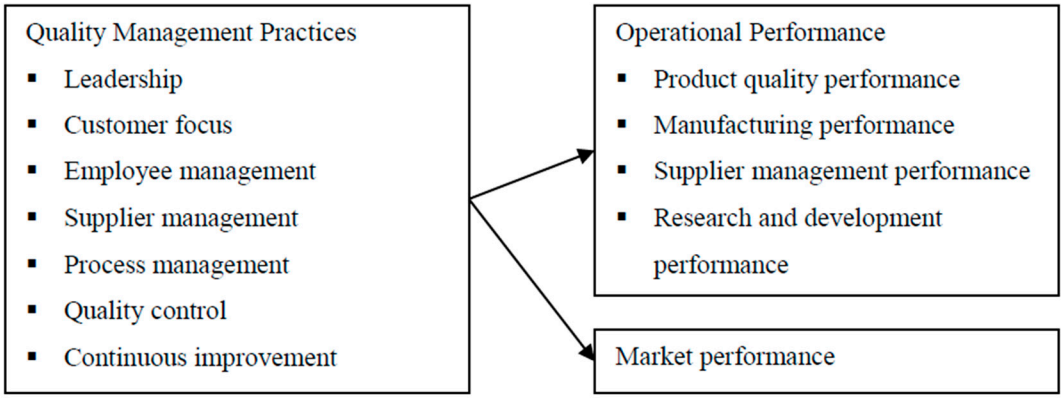

Figure 1. The research framework.

3.1. Research Design

A research design is systematic planning activities that are applied to answer the research questions [30,32]. This is a quantitative study that utilized a survey questionnaire in a structured and closed format. In addition, the quantitative approach was chosen as the data obtained can be analyzed statistically, and the conclusion can also be drawn statistically (i.e., mixed method). The majority of the previous studies on QMP utilized the quantitative approach. For instance, the study conducted by Fotopoulos and Psomas [6] in their study regarding the implementation of ISO 9001:2000 in the Greek food sector; the research conducted by Kafetzopoulos et al. [31] on their study regarding the impact of ISO 9001 and ISO 22000 implementation on the business performance; in the study about QMP of the Malaysia food processing industry by Talib et al. [27]; and the study conducted by Anuar and Yusuff [29] regarding the manufacturing practices of the ISO 9000 certified companies in Malaysia. Hence, in this study and based on the related work, we conducted qualitative and quantitative approaches to achieve the following research objectives: (i) To determine the extent of QMP implemented by the food manufacturing companies in Malaysia. (ii) To identify the level of QMP implemented by the small, medium, and large food manufacturing companies in Malaysia. (iii) To investigate the relationship between QMP with the operational performance and market performance of the food manufacturing companies in Malaysia.

3.2. Population and Sample

A total of 306 food manufacturing companies in Malaysia were identified and selected from the business directories published by the Federation of Malaysian Manufacturers (FMM) in the year 2014 and the SME Malaysia 2013 as respondents in [30]. Companies selected from the FMM directory are large companies if not mentioned in the SME directory, whereas those from SME directory of Corporation Malaysia are the SMEs. In the event that the same companies were recorded in both directories, the companies are automatically considered as an SME, and only one response is considered as the SME directory specifically represents the small and medium enterprises while the FMM directory includes all the three sizes. The population selection criterion was based on food manufacturing companies in Malaysia. The food manufacturing companies may be involved in the manufacturing of cocoa, cookies and biscuits, chocolate products and confectionery, grain mill products, production, processing or preservation of meat, fishes, and vegetables, and other food products (such as snack food). Based on this selection guideline, 83 companies were identified from the FMM directory and 223 companies from the small-medium enterprise's Corporation Malaysia. The sample size was determined by referring to Krejcie and Morgan [32].

3.3. Sampling Method

This study utilized the probability sampling strategy. This strategy selects samples randomly over a wide population, thus, making the results more representative [34,35]. Systematic random sampling is applied, where the sample is drawn from a population in a random and systematic approach. The simple statistic is obtained by considering the total number of populations with the sample size:

$$F = N/sn \quad (1)$$

where, f = frequency interval; N = total number of the population; and sn = the required sample.

Based on this equation, the frequency interval for companies identified in SME Corporation Malaysia is 1.5, whereas it is 1.3 for the identified companies under FMM. Owing to the small frequency interval, which is approximately equal to one, this study, therefore, included all companies identified in both the FMM and the SME Corporation Malaysia directories. This alternative is to account for non-response, respondent mortality, and attrition [29–31]. The respondents of this study are the Managing Director (responsible for the daily operations of a company, organization, or corporate division), General Manager (responsible for all of a company's operations, including generating revenue and controlling costs), Operation Manager (responsible for create strategies that increase efficiency and profit for a company. They also work with several departments to maintain the overall effectiveness of the business.), QA/QC Manager (responsible for ensuring the quality of products and services produced by their company with involvement in every stage of making a product), and QA/QC Executive (responsible for ensuring that the units produced or manufactured comply with an established quality standard).

3.4. Variables and Measures

In this section, the dependent variable and the independent variable were discussed, and the measurement items for the variables were presented. The independent variable refers to the input variable responsible for generating responses. On the other hand, the dependent variable is the outcome variable resulted from the independent variable. In this study, the independent variable refers to the QMP, and the dependent variables were the operational performance and market performance. QMP (independent variable) was expected to affect the operational performance and market performance of companies (responses).

This study aims to identify the current QMP implemented by food manufacturers in Malaysia. To meet the research objective, a survey questionnaire using a scale of 1 to 5 was developed to examine the current QMP. These practices were adopted mainly from previous literature, while others were

extracted from the Malaysia standard MS 1514: 2009 (GMP for Food). The implementation level of QMP among different companies' size was further analyzed by categorizing the collected data based on the size of companies. These companies were categorized into small companies, medium companies and large companies based on the number of full-time employees, and companies' sales turnover by referring to the guideline published by the SME Corporation Malaysia. The relationship between QMP and the operational and market performance of the companies was measured using a survey questionnaire studying the effect of QMP on quality performance, manufacturing performance, supplier management performance, research and development performance, and market performance.

3.5. Research Instrument

The survey questionnaire was constructed via an extensive review of previous literature concerning QMP, operational performance, and market performance of the companies. This process is crucial in determining the components to measure QMP and companies' performance. Components that were commonly used by previous researchers were used in this study. The items used in this study were mainly adapted from previous literature with certain items developed for this study. The reason is that the literature provides a comprehensive review for HACCP, ISO 9001, TQM, quality control (QC) and quality assurance (QA), but with limited study found in the GMP practices. Consequently, the GMP practices were adapted from the Malaysia Standard MS 1514: 2009 (GMP for Food). Meanwhile, each statement was adjusted accordingly to suit the purpose of the study. Appendix A (Table A1) presents a summarization of the HACCP, ISO 9001, and TQM components used in previous studies [6,29]; Appendix A (Table A2) presents the summarization of previous studies [6,13,24,32] on company performance.

3.6. Statistical Techniques

The statistical tools and method used in data analyzing include: (i) factor analysis, (ii) reliability analysis, (iii) descriptive statistic, (iv) *T*-test, (v) Pearson correlation analysis and (vi) regression analysis.

(i) *Factor analysis*: Factor analysis has been used for data reduction, data validity, and substantive interpretation. The correlation matrix, the Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity were examined. The exploratory factor analysis was conducted using the extraction method of principal component analysis. The rotation method used is varimax with Kaiser normalization. Hence, each factor tested remains only in one dimension to indicate that the suitability of items composed in each component [36].

(ii) *Reliability analysis*: Cronbach's alpha was used to test for reliability and internal consistency [27]. An alpha value of closer to 1 indicates high consistency reliability. All components in the questionnaire were subjected to Cronbach's α analysis to test for the reliability before proceeding for further data analysis. A typical α value of 0.6–0.9 was expected to be obtained, as shown in Table 3.

Table 3. Guidelines for alpha coefficient.

α Value	Description
>0.90	Very highly reliable
0.80–0.90	Highly reliable
0.70–0.79	Reliable
0.60–0.69	Marginally reliable
<0.60	Unacceptably low reliability

(iii) *Descriptive analysis*: The current QMP implementation and the level of implementation were identified via descriptive analysis by measuring the mean value. The implementation level was determined based on the components of QMP and types of QMP. There were three scales established based on the five points Likert Scale in the survey questionnaire to describe the results,

in which 1.00–2.33 = weakly implemented, 2.34–3.66 = moderately implemented, and 3.67–4.00 = strongly implemented.

(iv) *T-test*: The implementation level of the QMP among different levels of sizes of the company was analyzed using an independent T-test (bivariate). This is to compare the mean value based on the components and types of QMP for comparing between (i) small companies and medium companies, (ii) small companies and large companies, and (iii) medium companies and large companies.

(v) *Pearson correlation analysis***:** Pearson correlation analysis was used to measure the relationship between QMP (independent variable) with operational performance (dependent variable) and market performance (dependent variable) of the companies. The relationship was measured in two distinctive manners: (i) the components of QMP and (ii) the types of QMP. Before the analysis, the assumption of correlation analysis was checked.

(vi) *Regression analysis*: The relationship between QMP with the operational performance and market performance of the companies was analyzed using regression analysis to investigate the relationship between the independent variables with the dependent variables. The assumption of multiple regression was taken into consideration and tested before the analysis was done. The skewness and Kolmogorov-Smirnov test were conducted to check on normality.

4. Findings and Analysis

This section is on analysis based on the data collected via survey questionnaires. It includes the response rate of the distributed questionnaire, company profile, and respondents profile. The obtained data were statistically analyzed using SPSS version 22.0 (SPSS Software, IBM, Malaysia) for validity and reliability.

4.1. Response Rate

Among the 306 companies identified, 104 useable responses were received, corresponding to a response rate of 34%. The incomplete responses were not included in this study. Table 4 shows the response rate analysis. Random phone calls had been made to the non-responding companies to determine the reason for declining the survey. Among the reasons were the lack of time, resources for answering the survey, while others were not interested.

Table 4. Response rate analysis.

Company Size	Number of Responses	Response Percentage (%)
Small	43	41.4
Medium	30	28.8
Large	31	29.8
Total	104	100.0

4.2. Scale Validity and Reliability

The validity and reliability were tested in two ways, first, by analyzing the content validity and construct validity. The construct validity was analyzed using factor analysis. Data were then tested with Cronbach's alpha to test for the reliability of the data.

4.2.1. Validity Analysis

The validity test methodology was adopted from Krejcie, and Morgan [32], which is a comparative study regarding the performance of food companies. The validity analysis was modified to include content validity and construct validity. The components of QMP were selected through an extensive review of previous literature about QM, QMP. The construct validity was determined using factor

analysis [37]. Before conducting the factor analysis, the items used in this study were checked for its correlation and its appropriateness for factor analysis.

The correlation matrix indicated that many correlation coefficients were 0.3 and above, thus supporting the factorability [38]. The Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity value were checked to determine the appropriateness of factor analysis. The KMO value of greater than 0.6 and a significant Bartlett's test of sphericity value at 0.05 or smaller indicated that the data set is suitable for factor analysis. This study indicated a KMO value of 0.837, and Bartlett's test is significant at $p < 0.001$, which indicates that the data set is appropriate for factor analysis.

The exploratory factor analysis was conducted with the principal component analysis as the extraction method; varimax with Kaiser normalization as the rotation method as to retain the eigenvalue to be ≥ 1. A factor loading of 0.4 was used as a threshold in this study. The factor loading matrix was determined by referring to Krejcie and Morgan [35].

4.2.2. Reliability Analysis

The collected data were tested according to internal consistency with Cronbach's Alpha. An Alpha coefficient value of 0.60 and above is considered acceptable [39]. All variables were tested for reliability, and the alpha coefficients were shown in Table 5. The Cronbach's Alpha coefficient ranged from 0.755 to 0.964, and the overall reliability is high, showing alpha value of 0.983. Consequently, all variables were considered reliable for further analysis.

Table 5. Reliability analysis.

Variable	Component Index	Item	Cronbach's Alpha
Leadership	L	10	0.885
Customer focus	C	8	0.837
Employee management	E	10	0.938
Supplier management	S	7	0.821
Process management	P	14	0.964
Quality control	Q	15	0.957
Continuous improvement	I	8	0.891
Product quality performance	-	4	0.842
Manufacturing performance	-	5	0.871
Supplier management	-	4	0.755
R and D performance	-	4	0.901
Market performance	-	5	0.873
Overall reliability		94	0.983

4.3. Demographic Characteristics

The demographic characteristics were categorized into the companies' demographic information and respondents' information.

4.3.1. Company Background

Among the respondents 34.6% reported engaging in the manufacture of bakery products, 30.7% of the respondents were in the manufacturing of other food products, and 26.0% reported in the manufacturing of cocoa, chocolate, and sugar confectionery. The remaining companies indicated for the manufacturing of dairy products (5.8%), manufacturing of grain mill products (1.9%), and manufacturing of vegetable and animal oils and fats (1.0%), respectively. In terms of the number of employees, there were 27% of the companies having 5 < 75 employees; 34.6% of the companies with 75 < 200 employees, and 39.4% of the companies having >200 employees. For the companies' sales turnover, 32.7% of the companies indicated for companies' sales turnover of RM 300,000 <RM 15 million. The same percentage was observed in the sales turnover of RM 15 million <RM 50 million. There were 34.6% of the companies having a sales turnover of >RM 50 million.

These companies were categorized into three groups which were the small companies, medium companies, and large companies based on the number of full-time employees and its sales turnover, whichever is lower. For example, a company with several full-time employees found under the criteria of a small company with sales turnover under the criteria of a medium company will be considered as a small company [40]. Table 6 shows the companies profile in which the number of companies is N = 104.

Table 6. The companies' profiles.

Demographic	Manufacture Categories	f	%
Nature of business	Bakery products	36	34.6
	Other food products	32	30.7
	Cocoa, chocolate and sugar confectionery	27	26.0
	Dairy products	6	5.8
	Grain mill products, starches, and starch	2	1.9
	Vegetable, animal oils and fats	1	1.0
Number of employees	5 ≤ 75 employees	27	26.0
	75 ≤ 200 employees	36	34.6
	≥200 employees -	1	39.4
Company sales turnover	RM 300,000 ≤ RM 15 million	34	32.7
	RM 15 million ≤ RM 50 million	34	32.7
	≥RM 50 million	36	34.6
Years of a company in operation	2 ≤ 10 years	18	17.3
	10 ≤ 20 years	20	19.2
	20 ≤ 30 years	21	20.2
	≥30 years	45	43.3
Capital held by foreign companies	0%	104	100

Based on the official guideline published by the SME Corporation Malaysia, it was found that 41.4% belongs to small companies, 28.8% were occupied by the medium companies, and the remaining 29.8% were the large companies. The companies that have been in operation for more than 30 years represent a total of 43.3%. The companies that have been in operation between 20–30 years represent a total of 20.2%. The companies that have been in operation between 10–20 years represent a total of 19.2%. The companies that have been in operation between 2–10 years represent a total of 17.3%. Respondents were requested to indicate the implementation and certification status of the QMP and QA of the companies. Table 7 shows the QMP implementation and certification status.

Table 7. The implementation and certification status of the QMP.

Categories	QM		QM	
QMP	f	%	f	%
QC	101	97.1	69	66.3
QA	102	98.1	70	67.3
GMP	92	88.5	72	69.2
GHP	59	56.7	29	27.9
MeSTI	54	51.9	40	38.5
HACCP	91	87.5	67	64.4
Halal Assurance System	77	74.0	67	64.4
ISO 9001 System/ISO 22000	83	79.8	74	71.2
TQM	24	23.1	10	9.6
Others (FSSC 22000 and etc.)	25	24.0	14	13.5

The first column in Table 7 included the quality management practices (QMP), good manufacturing practices (GMP), good hygiene practices (GHP), hazard analysis critical control points (HACCP) system, the international organization for standardization (ISO) 9001 and the total quality management (TQM).

Table 7 shows that 97.1% of the responding companies are practicing QC and QA. However, among the practicing respondents, there are only 66.3% with certified QC and 67.3% with certified QA. In terms of the prerequisite program, 88.5% of the responding companies are discovered practicing GMP, whereas 56.7% of the responding companies are practicing the GHP. There is a total of 69.2% found to have a certified GMP system, and 27.9% with a certified GHP system. The HACCP system and Halal Assurance System are found to be practiced by 87.5% and 74.0% of the responding companies, respectively. However, there are only 64.4% of the companies are with a certified HACCP and HAS system, respectively. The QM system, such as ISO 9001 or ISO 22000 and TQM system, are practiced by 79.8% and 23.1% of the responding companies. A majority of the ISO practicing companies are certified with the ISO certification, indicating 71.2%, whereas there are only 9.6% of respondents with TQM certified. Other QMP implemented in the company include the FSSC 22000, which is practiced by 24.0% of the responding companies with 13.5% certified.

4.3.2. The Respondents

Table 8 indicates that 2.9% of the responses are from a Managing Director, and 18.2% of the responses are from the Operation/Factory/Production Manager. QA/QC Managers provided 29.8% of the responses and 35.6% from the QA/QC Executive/Officer. There are 13.5% of the respondents working as an Operation Executive/Officer. Regardig education, 75.0% have a bachelor's degree and 2.9% a postgraduate degree, 15.4% of the respondents are diploma holders, and 6.7% graduated from secondary school/SPM/STPM.

Table 8. Profile of respondents.

Demographic	Categories	F	%
Respondents' designation	Managing Director	3	2.9
	Operation/Factory/Production Manager	19	18.2
	QA/QC Manager	31	29.8
	QA/QC Executive/Officer	37	35.6
	Operations Executive/Officer	14	13.5
Respondents' experience in the food industry	<5 years	37	35.6
	5 ≤ 10 years	33	31.7
	10 ≤ 15 years	16	15.4
	15 ≤ 20 years	10	9.6
	≥20 years	8	7.7
Respondents' education level	Secondary school/SPM/STPM	7	6.7
	Diploma	16	15.4
	Degree	78	75
	Postgraduate (Master/PhD/Doctorate)	3	2.9

4.4. Descriptive Analysis

Descriptive analysis has been used to determine the current status of QMP implemented by the food manufacturing companies and the level of QMP implementation among different sizes of companies. Table 9 shows the results of the descriptive statistics used to compute the mean score for each practice.

Table 9. The value of seven components of QMP and their respective items.

Component Index	Description	Score Items	Score	Standard Deviation
L01	Top management involvement in establishing and communicating the organization's vision, goals, plans and values for quality process.	4.28	4.29	0.557
L02	Top management involvement in establishing the policy and objectives.	4.11		
L03	The extent to which quality values, principles and practices are adopted is routinely reviewed and improved.	4.13		
L04	The level of communication effectiveness within an organization.	3.98		
L05	Top management opinion about quality as an important criterion.	4.41		
L06	Top management commitment to the company's quality objective.	4.3		
L07	Resources allocation for quality improvement.	4.29		
L08	Encouragement for employees' involvement in the improvement activities.	4.24		
L09	Food safety team appointment for quality process.	4.38		
L10	Compliance to requirements of the Malaysian standard.	4.44		
C01	The customer satisfaction level.	4.08	4.17	0.4175
C02	Integrating customer satisfaction into the company's vision and goals.	4.2		
C03	Availability of customer complaints or feedback mechanism.	4.35		
C04	Analyzing and reviewing customer complaint and feedback.	4.42		
C05	Identify the customer inputs to determine their requirements.	4.11		
C06	Utilizing customer requirements as the basis for quality.	4.24		
C07	Application of after-sales strategies as part of our business strategies.	3.92		
C08	Employees' interaction with customers.	3.93		
E01	Availability of training needs assessment.	3.96	3.83	0.6355
E02	Establishing the training plan based on training needs assessment.	3.87		
E03	Resources allocated for the training program.	3.78		
E04	Frequency of quality-related training.	3.91		
E05	Frequency of appraisal or recognition received for an employee	3.63		
E06	The openness of communication within the organization.	3.89		
E07	The level of employee satisfaction.	3.63		
E08	Clearly defined responsibility of each employee within the organization.	3.96		
E09	The effectiveness of selection and recruitment process.	3.64		
E10	Clearly defined company structure (e.g., using organization chart).	4.08		
S01	Establishment of long-term co-operative relationship with suppliers.	4.29	3.83	0.5614
S02	Understanding the quality of material as the most important factor.	4.2		
	Supplier performance evaluation and feedback.	4.13		
S03	Reliance on a few dependent suppliers only.	3.39		
S04	Keeping detailed information about suppliers' performance.	3.93		
S05	Supplier involvement in product development.	3.33		
S06	Company participation in suppliers' activities related to quality.	3.62		
S07				

Table 9. *Cont.*

Component Index	Description	Score Items	Score	Standard Deviation
P01	Documenting the work instruction, process and system.	4.4	4.31	0.6143
P02	Calibrating and maintaining production equipment by a maintenance plan.	4.19		
P03	Keeping the production area clean and neat at all times.	4.16		
P04	Availability of products information such as the lot number.	4.35		
P05	Executing the traceability system.	4.41		
P06	Executing the product recall system.	4.3		
P07	We develop a documentation process and system.	4.24		
P08	Identification of potential food hazards.	4.41		
P09	Evaluating food hazards based on severity and likelihood of occurrence.	4.31		
P10	Determining the critical control point	4.43		
P11	Setting a critical limit for the identified critical control points (CCP).	4.34		
P12	Establishing control measures for all identified hazards and CCP.	4.27		
P13	Executing the monitoring system for all identified hazards and CCP.	4.37		
P14	Verifying the CCP to ensure effective implementation.	4.35		
			4.28	0.5541
Q01	Conformity of materials purchased to targeted standard.	4.39		
Q02	Planning on the manufacturing processes.	4.37		
Q03	Inspecting the incoming, in-process and outgoing finished product.	4.22		
Q04	Controlling of the non-conforming products.	4.38		
Q05	Labelling and segregating the non-conforming products.	4.25		
Q06	Investigating the causes of non-conforming products.	4.29		
Q07	Identifying the corrective action for the non-conforming products.	4.26		
Q08	Implementing the prerequisite program (PRP) such as GMP and GHP.	4.29		
Q09	Maintaining the personal hygiene of the food handlers.	4.43		
Q10	The premises, equipment and facilities are located, designed and constructed.	4.2		
Q11	Executing the materials receiving, storage and distribution process.	4.16		
Q12	Executing the maintenance, cleaning and sanitation process.	4.31		
Q13	Executing the chemical control process.	4.2		
Q14	Executing the pest control program.	4.29		
Q15	Executing the waste management program.	4.01		
I01	Availability of developed program aimed for finding time and cost loses.	3.98	4.06	0.6326
I02	Utilization of the seven QC tools for process control and improvement.	3.68		
I03	Utilization of the PDCA cycle for process control and improvement.	3.64		
I04	Conducting the internal audit for continuous improvement.	4.34		
I05	Reviewing the audit findings by the top management.	4.2		
I06	Implementation of the audit results and suggestion at all levels.	4.12		
I07	Verification over the audit finding to verify its nonconformities	4.22		
8	Management reviews on the quality objectives at regular intervals.	4.3		

Level of implementation was categorized based on 5 points Likert Scale where: 1.00–2.33 = weakly implemented, 2.34–3.66 = moderately implemented, 3.67–5.00 = highly implemented [41].

Table 9 tabulates the mean score for QMP components which ranged from 3.83 to 4.31. This implies that process management (mean = 4.31), leadership (mean = 4.29), QC (mean = 4.28), customer focus (mean = 4.17), and continuous improvement (mean = 4.06) are significantly implemented in the Malaysian food manufacturing industry. However, employee management (mean = 3.83) and supplier management (mean = 3.83) scored low, while supplier involvement in product development scored the lowest (mean = 3.33).

The level of QM practices implementation was analyzed in two ways. First, based on the components of QMP which includes leadership, customer focus, employee management, supplier management, process management, QC and continuous improvement. Next, based on the types of QMP which cover GMP, HACCP, ISO 9001 and TQM. The overall mean value for the components of QMP and the mean value of their respective items were computed based on companies' size and is tabulated in Table 10.

Table 10. The QMP mean value of seven components and their respective items.

Items Index	Mean			Overall Mean
	Small	Medium	Large	
L01	3.86	4.57	4.58	4.28
L02	3.74	4.1	4.61	4.11
L03	3.93	4.17	4.39	4.13
L04	3.77	4.03	4.23	3.98
L05	4.09	4.6	4.68	4.41
L06	4	4.43	4.58	4.3
L07	3.88	4.53	4.61	4.29
L08	3.98	4.33	4.52	4.24
L09	4.07	4.57	4.61	4.38
L10	4.23	4.53	4.65	4.44
Overall Mean	3.96	4.39	4.55	4.29
C01	3.95	4.13	4.19	4.08
C02	4.07	4.37	4.23	4.2
C03	4.12	4.33	4.68	4.35
C04	4.26	4.37	4.71	4.42
C05	3.91	4.27	4.23	4.11
C06	4.26	4.17	4.29	4.24
C07	3.81	4	4	3.92
C08	3.79	4.2	3.87	3.93
Overall mean	4.02	4.23	4.27	4.17
E01	3.7	4.27	4.03	3.96
E02	3.67	4.07	3.94	3.87
E03	3.65	3.73	4	3.78
E04	3.74	4	4.06	3.91
E05	3.6	3.67	3.65	3.63
E06	3.88	3.93	3.87	3.89
E07	3.56	3.7	3.65	3.63
E08	3.77	4.03	4.16	3.96
E09	3.65	3.57	3.71	3.64
E10	4	3.97	4.29	4.08
Overall mean	3.72	3.89	3.94	3.83
S01	3.95	4.43	4.61	4.29
S02	3.88	4.63	4.23	4.2
S03	4.07	4	4.35	4.13
S04	3.42	3.57	3.19	3.39
S05	3.79	4	4.06	3.93
S06	3.49	3.27	3.16	3.33
S07	3.74	3.63	3.45	3.63
Overall mean	3.76	3.93	3.87	3.83

Table 10. *Cont.*

Items Index	Mean			Overall Mean
	Small	Medium	Large	
P01	4.33	4.33	4.58	4.4
P02	4.05	4.2	4.39	4.19
P03	3.98	4.17	4.42	4.16
P04	4.12	4.43	4.58	4.35
P05	4.21	4.53	4.58	4.41
P06	4.07	4.4	4.52	4.3
P07	4.19	4.33	4.23	4.24
P08	4.19	4.47	4.68	4.41
P09	4.12	4.33	4.55	4.31
P10	4.23	4.5	4.65	4.43
P11	3.86	4.67	4.68	4.34
P12	4.02	4.53	4.35	4.27
P13	4.07	4.5	4.65	4.37
P14	3.95	4.63	4.61	4.35
Overall mean	4.1	4.43	4.53	4.31
Q01	4.12	4.57	4.61	4.39
Q02	4.07	4.57	4.58	4.37
Q03	4.05	4.47	4.23	4.22
Q04	4.12	4.53	4.61	4.38
Q05	3.98	4.33	4.55	4.25
Q06	4.21	4.43	4.26	4.29
Q07	4.05	4.47	4.35	4.26
Q08	4.19	4.1	4.61	4.29
Q09	4.28	4.47	4.61	4.43
Q10	4.16	4.2	4.26	4.2
Q11	4.16	4.13	4.19	4.16
Q12	4.09	4.33	4.58	4.31
Q13	4.19	4.23	4.19	4.2
Q14	4.16	4.47	4.29	4.29
Q15	3.93	4.2	3.94	4.01
Overall mean	4.12	4.37	4.39	4.28
I01	33.88	4.03	4.06	3.98
I02	3.79	3.67	3.55	3.68
I03	3.49	3.7	3.81	3.64
I04	4.3	4.5	4.23	4.34
I05	4.05	4.47	4.16	4.2
I06	3.95	4.4	4.1	4.13
I07	4.07	4.33	4.32	4.22
I08	3.91	4.53	4.61	4.3
Overall mean	3.93	4.2	4.1	4.06

In terms of small companies, the mean value ranged from 3.72 to 4.12; medium companies 3.89 to 4.43; and large companies 3.87 to 4.55. The large companies scored the highest mean value among all companies' sizes; whereas the mean value of medium companies is higher compared to the small companies. The conclusion that can be drawn is that the level of QMP implementation is the highest in large companies, followed by medium-sized companies and small companies. The QMP is categorized into the GMP food hygiene management practices, HACCP food safety management practices, ISO QMP and TQM total QMP. The mean value for different types of QMP is shown in Table 11.

Table 11. The mean value based on types of QMP.

Practices	Mean Company			Overall mean
	Small	Medium	Large	
GMP Food Hygiene (LEA 10, EMP 1, EMP 2, PRO 1, PRO 2, PRO 3, PRO 4, PRO 5, PRO 6, PRO 12, PRO 13, QUA 1, QUA 3, QUA 4, QUA 9, QUA 10, QUA 11, QUA 12, QUA 13, QUA 14, QUA 15, CON 4, CON 5, CON 6, CON 7, CON8)	4.076	4.377	4.370	4.250
HACCP Food Safety Management System (LEA 9, LEA 10, EMP 1, EMP 2, PRO 1, PRO 2, PRO 5, PRO 6, PRO 8, PRO 9, PRO 10, PRO 11, PRO 12, PRO 13, PRO 14, QUA 4, QUA 5, QUA 6, QUA 7, QUA 8, CON 4, CON 5, CON 6, CON 7, CON8)	4.063	4.425	4.450	4.283
ISO 9001 QM System (LEA 1, LEA 2, LEA 3, LEA 4, LEA 7, LEA 8, CUS 1, CUS 2, CUS 3, CUS 4, CUS 5, CUS 6, CUS 8, EMP 2, EMP 3, EMP 5, EMP 6, EMP 8, EMP 10, SUP 1, SUP 3, SUP 6, PRO 1, PRO 2, PRO 4, PRO 7, QUA 1, QUA 2, QUA 3, QUA 4, QUA 5, QUA 6, QUA 7, QUA 11, QUA 12, CON 3, CON 4, CON 5, CON 6, CON 7, CON 8)	3.973	4.237	4.296	4.145
TQM (LEA 1, LEA 5, LEA 6, LEA 7, LEA 8, CUS 1, CUS 3, CUS 5, CUS 6, CUS 7, EMP 1, EMP 3, EMP 4, EMP 5, EMP 6, EMP 7, EMP 8, EMP 9, SUP 1, SUP 2, SUP 3, SUP 4, SUP 5, SUP 6, SUP 7, PRO 1, PRO 3, CON 1, CON 2, CON 3)		3.841	4.057	4.099

Level of implementation was categorized based on 5 points Likert Scale where: 1.00–2.33 = weakly implemented, 2.34–3.66 = moderately implemented, 3.67–5.00 = highly implemented [42].

All the small, medium and large companies show high levels of implementation in hygiene management practices (mean = 4.076 to 4.377) and food safety management practices (mean = 4.063 to 4.450). The level of QMP implementation is relatively low (mean = 3.973 to 4.296). The level of total QMP is the lowest (mean = 3.841 to 4.099). Highest level of implementation on all types of QMP are indicated in large companies. This is then followed by medium-sized companies. Hence, small companies have the lowest level of implementation in all types of QMP.

4.5. Central Limit Theorem

The central limit theorem states that the distribution is of approximately normal when the sample is large enough; a sample size of 30 and above is considered large enough according to this theorem [43].

T-Test

T-test analysis has been conducted in two ways; based on the components of QMP, and the types of QMP. The T-test has been used to investigate the QM implementation level between different small, medium, and large companies and how the implementation different from each of the groups. The T-test assumption of bivariate independent variables and the normality distribution were checked before conducting the T-test. The result between different sizes of the companies based on the components of QMP is tabulated in Table 12.

Table 12. Independent T-test for components of QMP.

Component of Quality Index	Company Size	Mean	Std. Deviation	*t*-Value	Sig.
L	Small	3.96	0.60	–3.341	0.001
	Medium	4.39	0.45		
	Small	3.96	0.60	–4.84	0.000
	Large	4.55	0.38		
	Medium	4.39	0.45	–1.48	0.14
	Large	4.55	0.38		
C	Small	4.02	0.55	–1.892	0.06
	Medium	4.23	0.29		
	Small	4.02	0.55	–2.31	0.02
	Large	4.27	0.31		
	Medium	4.23	0.29	–0.59	0.56
	Large	4.27	0.31		
E	Small	3.72	0.73	–1.042	0.30
	Medium	3.89	0.62		
	Small	3.72	0.73	–1.43	0.16
	Large	3.94	0.47		
	Medium	3.89	0.62	–0.30	0.77
	Large	3.94	0.47		
S	Small	3.76	0.66	–1.167	0.25
	Medium	3.93	0.53		
	Small	3.76	0.66	–0.77	0.45
	Large	3.87	0.41		
	Medium	3.93	0.53	0.55	0.58
	Large	3.87	0.41		
P	Small	4.10	0.68	–2.305	0.02
	Medium	4.43	0.48		
	Small	4.10	0.68	–3.01	0.004
	Large	4.53	0.50		
	Medium	4.43	0.47	–0.81	0.42
	Large	4.53	0.50		
Q	Small	4.12	0.58	–1.764	0.08
	Medium	4.37	0.62		
	Small	4.12	0.58	–2.22	0.03
	Large	4.39	0.44		
	Medium	4.37	0.62	–0.18	0.86
	Large	4.39	0.44		
I	Small	3.93	0.71	–1.702	0.09
	Medium	4.20	0.62		
	Small	3.93	0.71	–1.18	0.24
	Large	4.11	0.49		
	Medium	4.20	0.62	0.69	0.49
	Large	4.11	0.49		

A significant difference is observed in some of the QMP components. Leadership component is implemented more extensively in the medium companies (mean = 4.39) compared to small companies (mean = 3.96) at $p < 0.001$. Process management component is found to be highly implemented in the medium companies (mean = 4.43) compared to the small companies (mean = 4.10) at $p < 0.05$. Other components of QMP such as customer focus, QA and continuous improvement are found significant at $p < 0.01$.

As observed in Table 12, comparing the small companies and large companies, a statistically significant difference is observed in the leadership. The larger companies have stronger leadership (mean = 4.55) as compared to the small companies (mean = 3.96) at $p < 0.001$. Customer focus, process management, and QM components are found to be implemented extensively by the large companies as well, showing significant at $p < 0.05$. However, there is no significant difference observed in the employee management, supplier management and continuous improvement. On the other hand, there is no significant difference in all the components of QMP.

Table 13 shows the T-test result for small companies and medium companies based on the types of QMP. The ISO 9001 is observed to have greater implementation level in the medium companies (mean = 4.24) as compared to the small companies (mean = 3.97) at $p < 0.1$.

Table 13. Independent T-test for types of QMP.

QMP	Company Size	Mean	Std. Deviation	*t*-Value	Sig.
GMP	Small	4.08	0.62	0.74	0.39
	Medium	4.37	0.54		
	Small	4.08	0.62	4.14	0.46
	Large	4.36	0.45		
	Medium	4.08	0.62	4.14	0.46
	Large	4.36	0.45		
HACCP	Small	4.06	0.64	0.98	0.33
	Medium	4.43	0.54		
	Small	4.06	0.64	2.76	0.10
	Large	4.45	0.47		
	Medium	4.06	0.64	2.76	0.10
	Large	4.45	0.47		
ISO 9001	Small	3.97	0.57	3.47	0.07
	Medium	4.24	0.44		
	Small	3.97	0.57	8.52	0.005
	Large	4.30	0.35		
	Medium	3.97	0.57	8.52	0.005
	Large	4.30	0.35		
TQM	Small	3.84	0.60	3.73	0.06
	Medium	4.06	0.44		
	Small	3.84	0.60	9.31	0.003
	Large	4.10	0.35		
	Medium	3.84	0.60	9.31	0.003
	Large	4.10	0.35		

For TQM, the medium-sized companies (mean = 4.06) seem to implement the TQM system extensively as compared to the small companies (mean = 3.84) at $p < 0.1$. No significant difference

is observed in the implementation level of GMP and HACCP between the small companies and medium companies.

A significant difference between the large and the small companies is shown in the implementation level in terms of the ISO 9001 system and the TQM program. Large companies are observed to have higher implementation level in both ISO 9001 (mean = 4.30) and TQM (mean = 4.10) compared to the small companies (mean for ISO = 3.97, mean for TQM = 3.84) at $p < 0.05$. On the other hand, no significant difference is observed in terms of the implementation level of the GMP and HACCP system. The T-test result between medium companies and large companies in terms of the types of management practices is tabulated in Table 13. Medium companies and large companies show no statistical difference in all types of QMP measured at all significant levels. It is observed that the large companies had a slightly greater level of QMP implementation in terms of HACCP, ISO 9001 and TQM as compared to the medium companies. An exception is observed in the implementation of GMP practices where the medium companies are found to have slightly greater implementation level.

4.6. Pearson's Correlation Analysis

Pearson's correlation was conducted to analyze the components of QMP and the types of QMP. The three assumptions for Pearson's correlation: (I) linear relationship between two variables, and (II) no significant outliers, and (III) variables were normally distributed, were tested prior to the analysis. These relationships have been investigated by plotting the scatter plot between the dependent variables and independent variables.

The scatter plot is shown in Figure 2. It was found that there is a positive linear relationship between these two variables. No significant outliers observed in the scatter plot hence assumptions I and II were fulfilled.

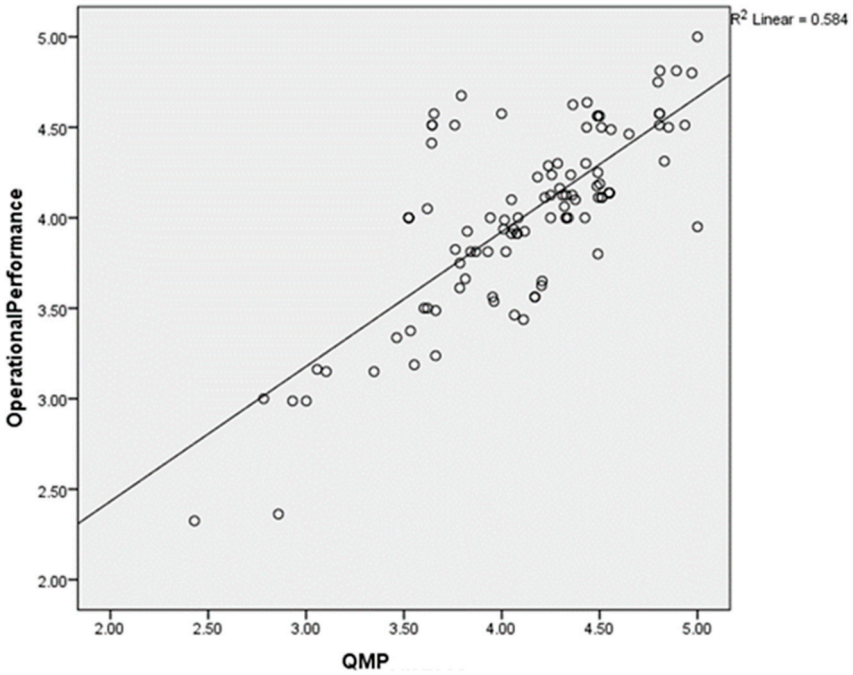

Figure 2. Scatter plot of QMP and operational performance.

The scatter plot of standardized predicted value and standardized residuals as shown in Figure 3 which indicated a linear relationship.

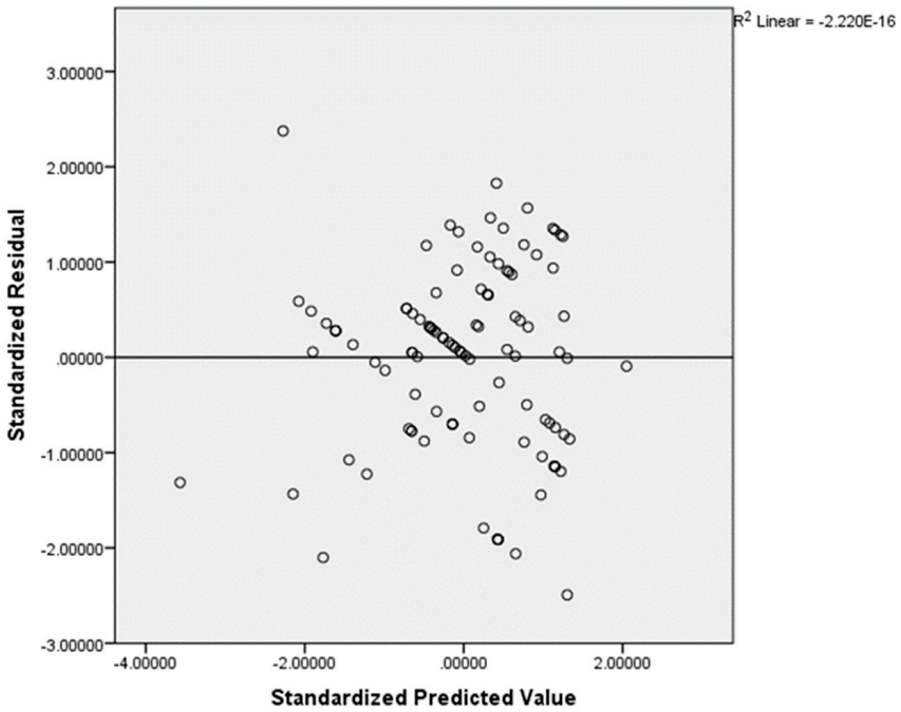

Figure 3. Scatter plot of standardized predicted value and standardized residual.

The current status of QMP implementation was identified using descriptive analysis. Malaysian food manufacturing companies have been found to be implementing various types of QMP, i.e., GMP, HACCP, ISO 9001 and TQM. Through the descriptive analysis, it is shown that the level of QM implementation is highest in the large companies followed by medium-sized companies and then the small companies. T-test analysis successfully demonstrated that there is a significant difference between different sizes of the companies in terms of the QMP implementation. Correlation analysis was conducted and the QMP was found significantly correlated with the operational performance and market performance. Based on the regression analysis, it was found that certain components of QMP were significantly related to operational and market performance. In summary, Figure 4 shows the implementation level of different types of QMP among the small, medium, and large companies. In terms of the level of implementation based on the types of QMP, large companies indicated an overall highest level in all types of QMP, followed by medium companies. The small companies were recorded with the lowest level of implementation. Both the medium and large companies focused more on the HACCP system and GMP practices. On the other hand, small companies emphasized more on GMP practices.

A significant difference was found in the implementation level of QMP components between the small companies with medium companies, and the small companies with large companies. However, no significant observed between medium companies and large companies. The same findings observed while comparing the implementation level based on the types of QMP among the small companies, medium companies, and large companies. This indicated that the implementation level was found different in the small companies compared to the medium and large companies, but no significant difference in the case of medium and large companies. This is in line with the study conducted by Abusa and Gibson [13] in identifying the level of TQM implementation in the Libyan manufacturing companies. They discovered that the TQM implementation level was showing no significant difference between the small-medium companies and large companies. The reason might be explained by the experience of the companies involved in the operation. The majority of the respondents (more than 60%) had been in operation line for 20 years and above. Even if the company size is medium, food QMP were already well established and implemented.

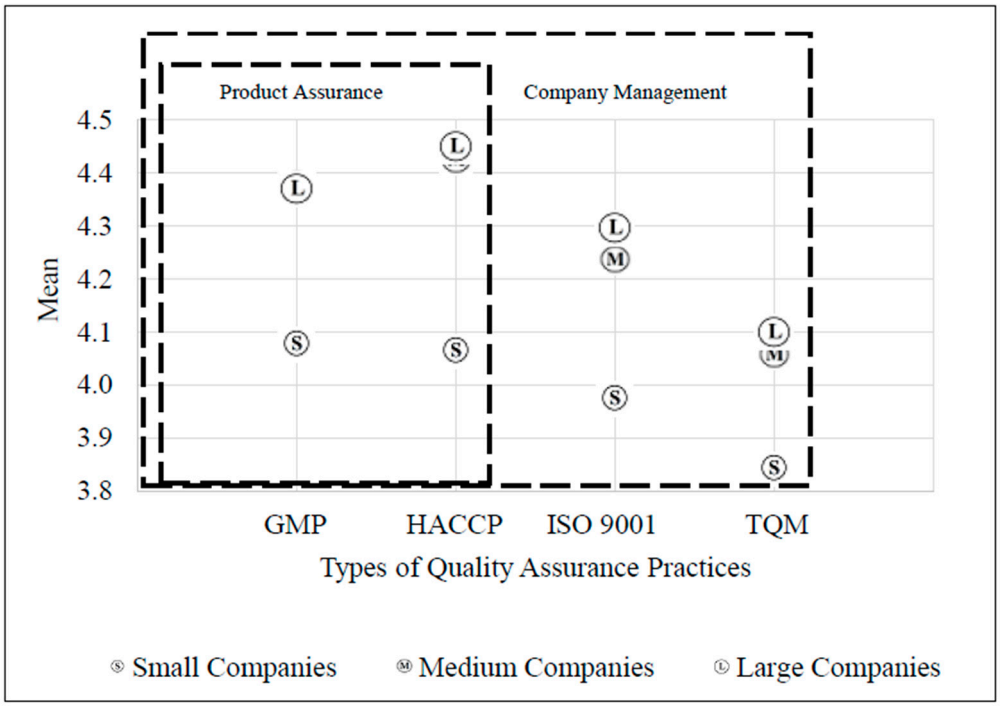

Figure 4. The implementation level for different types of QMP in companies of different sizes.

5. Conclusions

This study focuses on the QMP of companies' performance in the food manufacturing industry. A majority of the respondents' companies are from food manufacturing, confectionery manufacturers, and other food products. The quantitative approach was used to construct a survey questionnaire for collecting data to identify the extent and level of QMP implemented for small, medium, and large food manufacturing companies in Malaysia. The validity analysis was implemented and tested in two ways; content validity and construct validity. The components of QMP were selected through an extensive review of previous literature about QM and QMP. A majority of the items composed in each component were extracted from previous literature. Most items used in this study were adapted from previous literature, while a few others were developed for this study. The reason is that while previous literature has provided a comprehensive review of HACCP, ISO 9001, and TQM, there is a limited study in the GMP practices. Appendix A (Table A1) shows the summarization of the HACCP, ISO 9001, and TQM components used in previous studies, and Appendix A (Table A2) shows the summarization of previous studies on company performance. The GMP was adapted from the Malaysia Standard MS 1514: 2009 (Good Manufacturing Practices for Food). The survey questions were also adjusted accordingly to suit the purpose of this study. Respondents were discovered implementing the QMP in different implementation extent, and a number of these companies were with GMP, HACCP, or ISO 9001 certificates. The results indicated that the majority of food manufacturers are experienced and knowledgeable in terms of food quality management. A high level of implementation was observed in all QMP components. Process management, leadership, and quality control indicated the top three components which were highly implemented among the Malaysian food manufacturing companies. However, there were some QMP found to achieve a lower mean value (<3.70) among all the other practices. Supplier management was found to have the lowest mean value (3.83) among all the QMP components measured. The same finding was observed in previous studies conducted by Abusa & Gibson [13] of Libyan manufacturing industries in which supplier involvement (mean = 3.08) scored the lowest mean value, however, this study achieved a higher mean value ranged from 3.83 to 4.31 on the manufacturing best practices of Malaysian SME with mean value ranged from 3.08 to 4.20. Subsequently, the results of this study show that the components and types of QMP have

the highest impact on large companies, followed by medium companies and small companies in the food manufacturing industry. Comparing among different sizes of companies, large companies achieved an overall mean value that is highest than the medium and small companies. All sizes of companies were revealed an emphasis on different QMP components. The small companies found to be more focused (the top three highly implemented QM practices component) in the quality control, process management, and customer focus. The medium companies emphasized process management, leadership, and quality control, whereas the attention of the large companies was on the leadership components, process management, and quality control. This is supported by Talib and co-workers [27] reported that SMEs emphasized more in customer focus and quality management. The results were also in line with the study conducted by Islam and

Karim [35], who revealed that the SME companies emphasized more in the product quality compared to the large companies. This is further supported when the large companies were found to have a higher implementation level in the organization's quality policy. In this study, the company quality policy was placed under the leadership component; thus, suggested that large companies emphasized more in the leadership components. Surprisingly, the implementation level was relatively low in the supplier management across all sizes of company. One item of supplier management that involves with product development and improvement was marked low by respondents. The reason might be caused by a lack of interest from food manufacturers in revealing product development and improvement to third parties because of privacy and confidentiality. The outcome of this study can serve as a framework for food manufacturing industries in bringing an understanding of the food industry QM application and best practices, besides promoting continuous quality improvement practices. The data collected in this study may not be representative of other manufacturing industries such as the textile manufacturing industries, wood and wood products manufacturing industries, rubber and plastic manufacturing industries, electronic manufacturing industries, etc. The reason is that the QMP identified in this study refers to the quality standard of a food product; thus, it might not suit the actual situation of other manufacturing industries. Besides that, the research data may not be suitable for the service industries. Future research is suggested to include more financial performance indicators into the performance measuring process. Further research can also be conducted by including a greater variety of respondents from the food manufacturing industries, such as the manufacture of seafood products, vegetable products, beverages, etc. On the other hand, further research can also be conducted by emphasizing a single subsector, i.e., the snack food manufacturing industry.

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Appendix A

This appendix contains a summary of the literature for the identification of QMP components and items.

Table A1. The components and items of QMP.

HACCP	
	▪ Hazard identification ▪ Risk assessment ▪ Hazard control ▪ Hazard verification ▪ Implementation of PRP
ISO 9001	
1—Top management commitment	▪ Top management involvement ▪ Management communication ▪ Resources allocation ▪ Management encouragement
2—Customer management	▪ Identifying customer requirements ▪ Customer complaints handling ▪ Customer feedback and suggestion ▪ Customer satisfaction ▪ Employee interaction with a customer
3—Employee management	▪ Employee recognition ▪ Training ▪ Employee involvement in quality improvement ▪ Employee responsibility
4—Supplier management	▪ Supplier selection ▪ Supplier evaluation ▪ Relationship with supplier ▪ Supplier involvement in product development
5—Process management	▪ Available of work instruction and procedure ▪ Available of documentation system
6—Quality control	▪ Production planning ▪ Inspection quality plan ▪ Non-conformance controlling ▪ Material handling ▪ Existence of maintenance program
7—Continuous improvement	▪ Utilization of the PDCA cycle ▪ Internal audit ▪ Management review
TQM	
1—Leadership	▪ Management involvement ▪ Management communication ▪ Resource allocation ▪ Management encouragement
2—Customer focus	▪ Customer satisfaction ▪ Customer complaints ▪ Customer requirement
	▪ Customer involvement ▪ Customer-focused strategy

This appendix also presents a summary of the literature for the identification of components and items of operational performance and market performance.

Table A2. Operational performance and market performance components and items.

Operational	
1—Product quality performance	
	▪ Product quality ▪ Product conformity ▪ Product reliability and consistency ▪ Product return rate
2—Manufacturing performance	
	▪ Production flexibility ▪ Productivity ▪ Waste and the defective rate ▪ On-time delivery ▪ Manufacturing lead time
3—Supplier management performance	
	▪ Materials quality ▪ Inventory turnover ▪ Supplier management ▪ Price quoted
4—Research and development performance	
	▪ Product development lead time ▪ On-time product launched ▪ Number of product innovated ▪ Level of innovativeness
Market	
	▪ Market performance ▪ Sales growth ▪ Sales volume ▪ Profitability ▪ Profit margin ▪ Market share

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