

Article

Contribution of Quality Management Practices to Sustainability Performance of Vietnamese Firms

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Abstract: This study seeks to investigate the relationship between quality management practices and sustainability performance as well as the moderating effects from quality management implementation timeline, type of industry, and firm size on this relationship. Data were collected from enterprises in Vietnam from July 2016 to March 2017. Based on a sample of 144 valid responses, empirical results indicate that quality management practices have mixed impacts on economic performance and environmental performance, while show positive impact on social performance. The results found four quality management practices that have significantly positive impact on sustainability performance: top management support for quality management, design for quality, quality data and reporting, and continuous improvement. These practices could be considered as critical quality management factors that significantly contribute to sustainability goals. Furthermore, the study found significant moderating effects of three contextual factors on the relationship between quality management practices and sustainability performance. The study enriches the literature on quality management and sustainability management, and offers some important insights into efficient allocation of resources to achieve sustainability goals.

Keywords: quality management; sustainability; contextual effect

1. Introduction

Sustainable development is an accelerating trend that is important to all humankind. People are enjoying higher quality of life with rapid economic growth, but they must also cope with serious environmental degradation (pollution, global warming, etc.) and social problems (diseases or inequity). The concept of sustainability, either at strategic level or operational level, could be viewed from a perspective of the triple bottom line which consists of three elements: the social equity bottom line (people), the environmental bottom line (planet), and the economic bottom line (profit). The social bottom line refers to equity and quality of life for all people either working for the organization or not [1]. The environmental bottom line concerns the impact of the organization on “living and non-living natural systems” such as land, water, air and ecosystems [2] (p. 48). The economic bottom line refers to both financial and non-financial values created by the organization that benefits not only shareholders but also stakeholder groups [2]. To achieve sustainability goals, the three aspects of the triple bottom line must be harmonized, integrated and balanced effectively.

Profitability is still the priority of most organizations. To increase financial benefits, many organizations sacrificed the environment aspects. Awareness of “sustainable development” motivated them to effectively balance among the three aspects—finance, environment, and society. To do so, enterprises should implement “sustainability management”, which is defined as “accelerating the

adoption of best management principles, models, and practices throughout the operations system, and enabling the environment to achieve sustainable development” [3]. Quality management (QM), besides the ultimate goal to provide superior values to customers by continuously improving process efficiency, is also recognized to share similar purposes and common implementation factors with environmental management system [4]. Quality management, in this sense, would be a feasible approach contributing to sustainability performance (SP). Along with this, the question on how the implementation of quality management practices would affect sustainability performance, therefore, is of great importance not only to practitioners, but also to policy makers and academic researchers.

Regarding research context, the industrial development is moving to developing countries, academic studies also switch to and pay attention more to developing countries. Vietnam is not an exception, especially when many multinational companies have been establishing plants or offices in Vietnam such as Toyota, Coca-Cola, Unilever, and so on. Vietnam is a fast-growing economy with an average GDP growth rate of 6.19% in the period from 2000 to 2017 [5]. Currently, Vietnam is becoming an active player in the regional and global business [6]. The nation is known as a leading exporter in terms of agriculture products and attractive destination for foreign investment in fields of manufacturing and information technology industries.

In Vietnam, the awareness of “sustainability” has been increasingly widespread in the recent decade. The Vietnamese Government has approved the Sustainable Development Strategy for the period 2011–2020 (Decision No. 432/QĐ-TTg). From a practical side, the Vietnam Business Council for Sustainable Development was established under the approval by the government in 2010. This is a business-led organization with the mission to promote the business community for the implementation of the Strategic Orientation for Sustainable Development in Vietnam. From an academic perspective, sustainability is a concerned topic in some studies but mainly in the field of agriculture [7–10].

In the field of operations management research, there is still a limited academic work investigating the linkage between operations management systems and sustainability in developing countries. Particularly, from our best knowledge, there is no previous study on quality management and sustainability performance in Vietnam context. To address the research gap, this study aims to empirically test the direct impact of QM practices on SP, and moderating effects of QM experience time, type of industry, and firm size on the relationship between QM practices and SP. Findings from this study highlights the contribution of four critical QM practices including Top management support for QM, Design for quality, Quality data and reporting, and Continuous improvement to sustainability performance. Moreover, the study also discusses the role of different practices in different enterprise groups based on QM experience time, type of industry, and firm size.

Following the introduction, the latest literature on quality management and sustainability performance will be summarized in Section 2. Section 3 describes analytical framework and hypotheses development, followed with data collection process and measurement test in Section 4. Section 5 presents the results of the data analysis and hypotheses testing. Finally, we conclude with the discussions, implications, limitations, and suggestions for further research.

2. Literature Review

2.1. Quality Management

Quality management in the early 1900s primarily meant inspection to ensure quality product. In the 1930s, statistical analysis and control of quality were developed by Walter Shewhart. Around the 1950s, some quality gurus made huge contributions to quality management method diffusion. W. Edwards Deming taught managing quality through statistical techniques to Japanese people. Joseph M. Juran introduced the concepts of controlling quality and managerial breakthrough. Phillip B. Crosby promoted zero defects for quality improvement [11]. From the 1960s, quality management has been viewed from a broader perspective as “companywide quality control” (ASQ), “an integrated approach to achieving and sustaining high quality output” which involves “all levels

and all functions of the organization” [12]. From this point of view, quality management is made up by a set a companywide quality management practices and techniques [4,13,14] with the purpose to deliver high quality products to customers.

To support and encourage the quality improvement from an international perspective, International Organization for Standardization (ISO) has been established in 1987 including members from 163 countries. The organization provides ISO 9000 as a family of quality management standards and guidelines for organizations to ensure their product and service quality. ISO 9001 (2015) based on seven quality management principles: customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision making, and relationship management. The framework of ISO 9001 (2015) standards follows the PDCA (Plan–Do–Check–Act) cycle [15] (see Figure 1).

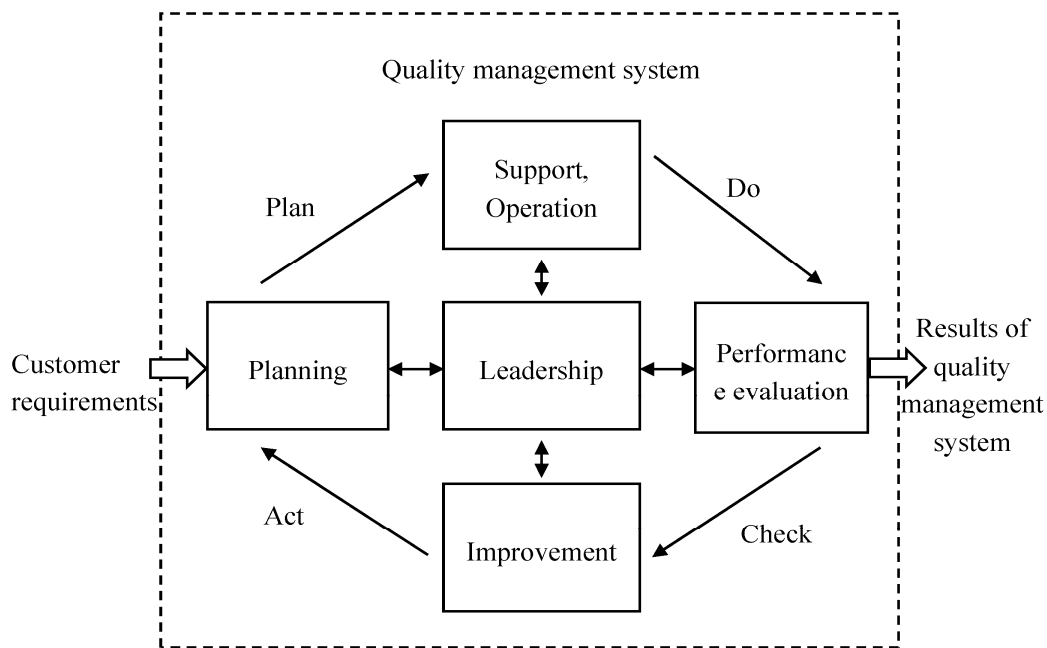


Figure 1. Framework of ISO 9001:2015 standards. (Source: Quality management system—Requirements ISO 9001:2015 [15].)

Later, several national quality awards were established with clear criteria to promote better quality management practices such as Malcolm Baldrige Award in the US (1988); Shingo Prize (1988) (originally in the US, now it is a worldwide recognized prize); HKMA Quality Award in Hong Kong (1991); European Quality Award (1992); New Zealand Business Excellence Award (1993); Japan Quality Award (1996); and Egyptian Quality Award (1998) [7,16] (see Table 1).

Table 1. National quality award criteria.

Award	Criteria
Malcolm Baldrige Award	Leadership; Strategic planning; Customer and market focus; Information and analysis; Human resource focus; Process management; Business results
Shingo Prize	Culture enablers; Continuous improvement; Enterprise Alignment; Results
HKMA Quality Award	Leadership; Strategic planning Customer and market focus; Information and analysis; Human resource focus; Process management; Business results
European Quality Award	Leadership; Policy and strategy; Partnership and resources; People management Process; People results; Customer results Society results; Key performance results
New Zealand Business Excellence Award	Leadership; Strategic planning; Customer and market focus; Measurement, analysis and knowledge management; Human resource focus; Process management; Business results
Japan Quality Award	Management vision and leadership; Strategic planning and development; Understanding customer and market and action taken; Information sharing and utilization; Human resource development and learning environment; Process management; Results of enterprise activities; Customer satisfaction
Egyptian Quality Award	Leadership; Planning; Customer and market focus; Information and analysis; Human resources; Process management; Business results

Source: [7,16].

Regarding academic research, one of the main research orientations in this theme is to develop and validate models and measures of quality management in various operational settings [14]:

- Saraph, Benson, and Schroeder [17] made a pioneering work to identify and confirm the reliability and validity of eight critical factors of quality management: (1) the role of management leadership and quality policy; (2) role of the quality department; (3) training; (4) product/service design; (5) supplier quality management; (6) process management; (7) quality data and reporting; and (8) employee relations [17].
- Flynn, Schroeder, and Sakakibara [18] validated seven key dimensions of quality management: (1) top management support; (2) quality information system; (3) process management; (4) product design; (5) workforce management; (6) supplier involvement; and (7) customer involvement [18]. In 1995, this group of authors tested measurement instruments for quality management in world-class manufacturers in the US [12]. The world-class manufacturers were randomly selected from a master list that was developed using Dun's Industrial Guide: The Metalworking Directory [19], JETRO's information, and Schonberger's [20]. Eight key dimensions divided into Core Quality Management Practices are examined: (1) process flow management; (2) product design process; (3) statistical control and feedback; and Quality Management Infrastructure Practices comprising (4) top management support; (5) workforce management; (6) work attitudes; (7) supplier relationship; and (8) customer relationship. This study also tested the impact of quality management practices on performance and competitive advantage and discussed in light of Garvin's eight dimensions of quality.
- Anderson, Rungtusanatham, Schroeder, and Devaraj [21], based on 14 Points of Deming, conducted a thorough analysis on the Deming Management Method and identified seven underlying dimensions of quality management: (1) visionary leadership; (2) internal and external cooperation; (3) learning; (4) process management; (5) continuous improvement; (6) employee fulfillment; and (7) customer satisfaction [21].

Those are pioneering and widely-adopted works in developing and validating measurement constructs for QM. After that, numerous studies have defined and measured quality management practices, and analyzed their implementation in enterprises in both developed countries, such as Japan [22], the US [23–25], Hong Kong [14], Australia [26,27], Spain [28–30], and Singapore [31];

and developing countries, such as China [14,24,32], South Korea and Taiwan [33], Malaysia [34], Turkey [35,36], Thailand [37], Mexico [25], Ghana [38], Tunisia [39], and Vietnam [6,40,41].

Inherited from fundamental guidelines of quality gurus and findings of pioneers in the field of quality management, this study focuses on internal quality management and defines quality management practices as companywide and cross-functional practices within the organization which emphasis on process management, product and service design for quality, quality-related problem solving and training, quality data and reporting, and continuous improvement. The study evaluates internal quality management practices based on eight constructs: (1) top management support for quality management; (2) training on quality; (3) product/service design; (4) quality data and reporting; (5) process management; (6) continuous improvement; (7) problem solving; and (8) rewards. These are widely accepted and adopted constructs for quality management practices from previous studies.

2.2. Sustainability Performance

In the global economy today, business management has been increasingly aware of the need for sustainability management which aims to achieve social, environmental and economic performance simultaneously. Kuei and Lu [3] defined sustainability management as “accelerating the adoption of best management principles, models, and practices throughout the operation system, and enabling the environment to achieve sustainable development”. Edgeman [42] developed a Sustainable Enterprise Excellence framework based on business excellence models including Baldrige National Quality Award, European Quality Award and sources of sustainability indicators from Global Reporting Initiative and the United Nation Global Compact. Edgeman and Eskildsen [43] introduced a maturity assessment regiment of the Sustainable Enterprise Excellence model that is a combination of graphical NEWS (North–East–West–South) compasses and SWOT (Strengths–Weaknesses–Opportunities–Threats) plot narratives.

Sustainability performance is conceptualized as an outcome of sustainability management. Sustainability performance can be defined as “the combination of its economic, social and environmental performance” [44], and “the performance of a company in all dimensions and for all drivers of corporate sustainability” [45]. Figge et al. [46], based on the Balanced Scorecard of Kaplan and Norton, discussed three possible approaches to integrate the three dimensions of sustainability into a single framework called Sustainability Balanced Scorecard. The first approach is to integrate environmental and social aspects into the existing four dimensions of the conventional Balanced Scorecard—financial perspective, customer perspective, internal process perspective, and learning and growth perspective. The second approach suggests adding environmental and social aspects as a new perspective. The third approach is to formulate an environmental and/or social scorecard. The nature of the environmental and social aspects of each specific business unit should be taken into serious consideration during the process of formulating a Sustainability Balanced Scorecard [46]. Chardine-Baumann and Botta-Genoulaz [44] proposed a framework and indicators to assess sustainability performance including Economic dimension (Reliability, Responsiveness, Flexibility, Financial performance, and Quality), Environmental dimension (Environmental management, Use of resources, Pollution, Dangerousness, and Natural environment), and Social dimension (Work condition, Human rights, Societal commitment, Customers issues, and Business practices) [44]. The studies confined themselves at the conceptual level.

In this paper, sustainability performance is defined as the balanced performance among three aspects—social, environmental, and economic performance. Adopted from Chardine-Baumann and Botta-Genoulaz [44] with customizations, this research measures sustainability performance based on three aspects: economic performance, environmental performance, and social performance.

2.3. Research on Quality Management and Sustainability Performance

Many practitioners and scholars have investigated and integrated their operations areas of interest with sustainability goals [47]. Quality management system is one of feasible approaches

towards sustainability performance. Several studies examined how sustainability challenges would be addressed by quality management principles and practices [3,47]. Kuei and Lu [3] proposed a conceptual framework of quality-driven sustainability management systems by integrating quality management principles into sustainability management. The study also found implementation steps for cross-enterprise and functional units operations. Isaksson [47] investigated possible synergies between total quality management (TQM) and sustainable development (SD) based on common values, methodologies and tools. Values of TQM: “focus on processes” and “systems perspective” and values of SD: “stakeholder focus”, “accountability” and “sustainability” are discussed as values of the TQM-SD management system. Adopted process-based management methodology from TQM and GRI-guidelines for SD, a process model was proposed to describe the triple bottom line in which quality indicators were proposed to add to the economic dimension. A majority of papers regarding QM and three components of SP are conceptual studies to propose descriptive insight, model, proposition, framework, and ideas [48].

Most empirical studies in the field of QM and SP have only focused on a single aspect of sustainable performance. Regarding economic aspect, there are empirical studies investigating the linkage between quality management practices and financial performance [23,28,32,49], organizational performance [50], and business performance [24]. Some studies examined QM and antecedent of economic performance such as operational performance [12,28,38,39,51–54], production performance [34], and quality performance [22,23,26,33,55,56]. Regarding environmental performance, some studies found the contribution of quality management system to environmental performance [4,57–60]. Empirical evidence shows that enterprises with QM implementation in accordance with ISO 9001 intertwine with environmental management system ISO 14001 obtain higher benefits than the others [61]. Besides, the supportive role of lean production to environmental performance is empirically demonstrated [41,59,62]. Regarding social performance, several empirical works examined the relationship of QM practices and some stakeholder-benefit aspects such as customer support and service [63], customer related performance [34], customer satisfaction [21,24,25,27,59,64,65], and employee performance [21,28,29,35,64,65]. These studies mainly considered employee- and customer-related performance, rather than community-related performance.

Some papers focused on specific approaches of QM towards sustainability such as Toyota Production System [57], Lean management [59,66], and Quality Function Deployment [67–69]. Bergenwall et al. [57] compared the TPS principles and TPS implementation by American automakers, and discussed how the TPS process designs would impact on three dimensions of sustainability in the cross-cases. The study found that TPS contributes to the economic dimension by creating more efficient processes, increasing effective capacity, and cutting cost; to environmental performance by reducing wastes and defective items; and to social dimension by offering workplace safety, job protection, and training [57]. King and Lenox [66] provided empirical evidence for the complement role of lean production, evaluated by ISO 9000 implementation and low investment level, to environmental performance. Furthermore, Yang et al. [59], based on data from 309 manufacturing enterprises, found a significant contribution of lean management practices to environmental performance, financial performance, and market performance through a mediating role of environmental management practices. Besides, Quality Function Deployment has been proposed as an ideal tool to design sustainable products. Vinodh et al. [68] adopted a fuzzy Quality Function Deployment in design of electronic products. After determining customer requirements, sustainability parameters and sustainability tools by reviewing the literature, the study developed a house of quality that presents the interrelationship among customer requirements, sustainability parameters and tools. From the house of quality, the most important sustainability parameters and tools are identified.

Either a Total quality management or a particular QM approach such as Toyota Production System, Lean management, or a certified management system following ISO 9001, commonalities between QM principles and Sustainability could be found. Firstly, the “zero defects” goal of QM or “waste reduction”

principle of lean management works closely with “no waste” aim of environmental management system [4]. Eliminating wastes and defective items also mean reduction of resource consumption and pollution, and in turns, improve the environment. Secondly, QM following TQM and ISO 9001 offers committed leadership, participation of everybody, employee training and empowerment, relationship management, customer focus, mutually beneficial supplier relationship [15,18,47]. These values are consistent with objectives of social dimension that assure benefits of internal and external stakeholders. Thirdly, both QM and sustainability pursue a goal of economic performance. Improving quality, enhancing process efficiency, and cutting down unnecessary costs are approaches of QM to achieve and sustain higher profits or economic bottom line.

To date, there is still insufficient documentation for the contribution of QM practices to SP, particularly empirical evidence. To fill this gap, this paper analyzes the impact of QM practices on three dimensions of SP as well as the moderating effects of QM implementation experience timeline, type of industry, and firm size on this relationship.

3. Analytical Framework and Hypotheses Development

In this paper, an analytical framework is developed to depict the relationship between QM practices and SP as well as the effects of contextual factors including QM experience timeline, type of industry, and firm size on this relationship (see Figure 2).

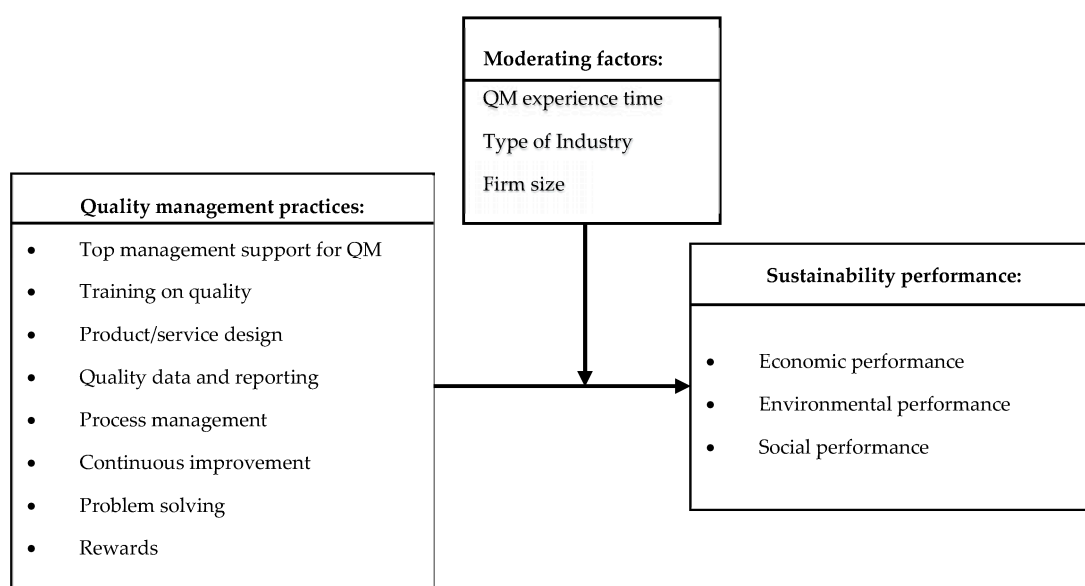


Figure 2. Analytical framework.

Many previous empirical studies have examined the linkage between quality management practices and various performance dimensions. Although utilizing different measurement instruments in different research settings, some studies have demonstrated positive contributions of QM practices to economic-related performance [23,28,32,49,53], environmental-related performance [57–60], and social-related performance [24,32,35,63].

The Cost of Poor Quality [70] would be considered as a supporting theory for the linkage between QM and sustainability performance. Cost of Poor Quality refers to the losses and wastes that would disappear if systems, processes, and products were perfect [47]. High Cost of Poor Quality means lower sustainability performance. QM practices is an approach to reduce Cost of Poor Quality, and, in turn, improve sustainability performance. Dominant empirical evidence has supported the positive contribution of numerous quality management practice to organizations’ performance:

- *Top management leadership for quality*: Plays a vital role in setting the quality goals and strategies of the organization to achieve the goals [12]. The support from top management would encourage behaviors and performance throughout the organization toward sustainability goals. The positive influence of top management leadership for quality on other quality management practices and performance is well supported by empirical evidence in [21,23,36,63].
- *Training on quality*: Providing *Training on quality* will enhance skills of employees, especially quality-related skills. Having a good policy on internal human resource is a contribution to social sustainability. In addition, by improving skills, employees would improve the accuracy of the production processes, and in turns, reduce defects and increase the quality performance in general. This contributes to environmental and economic sustainability. This argument is supported in the literature [12,23,71].
- *Product/service design*: The importance of *Design* for high quality and defect-free product was emphasized by both Joseph Juran and Genichi Taguchi [72]. As a result, it would contribute to a reduction in wastes and material consumption, and, in turn, contribute to environmental sustainability. In addition, design for producibility and simplification would better standardize components, make it easier to produce, and lead to higher process efficiency [12,23,73]. The positive contribution of product design was demonstrated in [30,55].
- *Quality data and reporting* refers to the availability of information on the quality-related performance which would help managers make appropriate decisions timely based on the facts [65], and quickly detect and prevent quality problems [12,14,74]. This contributes to not only the improvement of economic efficiency but also environmental performance through defect reduction.
- *Process control*: Seven tools for statistical quality control were developed and disseminated by Ishikawa [72]. Thorough *process control* using statistical techniques is postulated to reduce process variance which, in turns, prevents defective components or products [12,63]. As a result, economic and environmental performance would be improved by reduction of material consumption as well as waste emission. The positive impact of process control is supported by empirical studies [14,23,24,26,28,36].
- *Continuous improvement*: With *continuous improvement*, organizations take never-ending efforts to improve their products and processes which, in turns, are expected to result in better overall sustainability performance. The contribution of continuous improvement is indicated in [34,75,76].
- *Problem solving* teams are usually formed with cross-functional members to deal with quality-related problems. Finding and addressing the causes of problems would prevent a repetition of the same defect type, leading to an improvement in both environmental and economic performance. This argument is supported in [12,63].
- *Rewards* are incentives for good ideas or performance with a purpose to encourage working attitudes of employees. This practice would promote overall performance, and especially contribute to social performance through employee satisfaction. The contribution of rewards is indicated in [12,41].

Based on the literature, hypotheses for the impact of QM practices on SP are stated as followed:

Hypothesis (1a): *QM practices positively impact on economic performance.*

Hypothesis (1b): *QM practices positively impact on environmental performance.*

Hypothesis (1c): *QM practices positively impact on social performance.*

When experience with QM implementation is considered a moderating variable, it is likely that companies with a couple of years implementing QM often experience many changes in both practices and performance. They try to comprehensively improve the whole systems which would lead to

some significant achievements. Once they achieve a certain higher performance level than before QM implementation, the contributions of QM practices, then, are not so obvious as at the early stage. Organizations with the longer time experience in QM would see little improvement or even stable practices and performance. From this argument, hypotheses for the effect of QM experience timeline on the relationship between QM practices and SP are stated as followed:

Hypothesis (2a): *Companies with shorter QM experience time have higher level of QM practices implementation than the ones with longer time experience.*

Hypothesis (2b): *Companies with shorter QM experience time see more significant impact of QM practices on SP than the ones with longer time experience.*

Characteristics of organizations are suggested to have some effect on QM implementation [77]. Firm's size and type of industry have been demonstrated to influence QM implementation by [78–80]. As such, hypotheses for the effect of industry and size on the relationship between QM practices and SP are stated as followed:

Hypothesis (3a): *There are significant differences in level of QM practices implementation across groups with different types of industry.*

Hypothesis (3b): *There are significant differences in the impact of QM practices on SP across groups with different types of industry.*

Hypothesis (4a): *There are significant differences in level of QM practices implementation across groups with different firm size.*

Hypothesis (4b): *There are significant differences in the impact of QM practices on SP across groups with different firm size.*

4. Data Collection and Measurement Test

4.1. Designing Questionnaire

A questionnaire was first developed in English by adopting measurement items from previous studies. The content of the questionnaire was thoroughly reviewed by professors in the field of operations management. After receiving comments from professors, the questionnaire was revised accordingly. Then, the questionnaire was discussed at PhD seminar with professors and PhD students in the field of operations management. During this period, the questionnaire was provided to a former plant manager of a company to get comments from a practical view. After three months of continuous reviewing, discussing and revising, the English version of the questionnaire was finalized.

To measure QM practices, eight scales are constructed: (1) top management support for QM; (2) training on quality; (3) product/service design; (4), quality data and reporting; (5) process management; (6) continuous improvement; (7) problem solving; and (8) rewards. Eight scales of QM practices are constructed to ask about the extent respondent agree with given statements by a five-point Likert scale from 1 = strongly disagree to 5 = strongly agree. Question items of QM practices are adopted from [12,15,17,22,23,35,51,63].

To measure sustainability performance, three scales are constructed: (1) economic performance; (2) environmental performance; and (3) social performance. Three scales of SP ask about the level of performance improvement of the organization in the last two years by a five-point Likert scale from 1 = significant decrease to 5 = significant increase. Question items of sustainability performance are adopted from [44,81].

Demographic information about the organization includes five question items regarding type of the organization, main ownership, time experience with QM, number of employees, and industry.

The questionnaire was then translated into Vietnamese. A cover letter was prepared to send greetings and basic information on the survey to respondents. The final set of documents, including cover letter, English questionnaire version, and Vietnamese questionnaire version, was sent to respondents.

4.2. Sampling and Data Collection

Sampling: In this study, the target population is Vietnam-based enterprises. Contact information of the companies was collected from three sources: the main source is the website of informative porter for business establishment in Vietnam (<http://vtown.vn/en/>), the second source is a list of companies from Jetro Vietnam, the third source is a list of enterprises that attend numerous conferences and/or workshops in fields of operations management, quality management, and supply chain management. Target contact people are top management, therefore, the information from various sources is collected and screening. A total of 611 companies with information on personal contact was selected.

Data collection: The set of questionnaires was sent to all 611 companies by email. In the email, the link to the questionnaire on surveymoney.com was also included. After sending email the first time, reminding email was sent twice after every two weeks, followed by a phone call at the third time of reminding. The data collection period is nine months with two phases: the first phase was from July 2016 to September 2016, and the second phase was from November 2016 to March 2017. Finally, 158 responses were received (response rate at 23.5%).

4.3. Data Description

In total, 158 responses were received during data collection in 2016. Data screening suggested that 14 responses should be rejected due to missing values. A final sample of 144 valid responses was used in the analysis (see Table 2).

Table 2. Characteristics of the companies.

QM Experience Timeline	No. of Company	Firm Size (No. of Employee)	No. of Company	Type of Industry	No. of Company
Less than 5 years	38	No more than 50	58	Industrial	64
5 to 10 years	35	51–300	49	Consumer goods	30
More than 10 years	29	More than 300	37	Basic materials	25
Missing	42	Missing	0	Consumer services	22
-	-	-	-	Missing	3
Total	144	Total	144	Total	144

A total of 102 over 144 respondents filled the question items on Experience time of quality management implementation (42 missing, corresponding to 29.2%). Based on a descriptive analysis, the sample of 102 responses could be divided into three groups:

- Less than 5 years with 38 companies (26.4%);
- From 5 to 10 years with 35 companies (24.3%);
- More than 10 years with 29 companies (20.1%).

A total of 141 over 144 respondents filled the question items on the industry of the organization (three missing, corresponding to 2.1%). Based on a descriptive analysis, the sample of 141 responses would be divided into four groups categorized by industry type:

- Industrial with 64 companies (44.4%);
- Consumer goods with 30 companies (20.8%);

- Basic materials with 25 companies (17.4%);
- Consumer services with 22 companies (15.3%).

All 144 respondents filled the question items on the number of employees of the organization. Based on a descriptive analysis, the sample of 144 responses would be divided into three groups categorized by firm size:

- Small size with no more than 50 employees (58 companies, corresponding to 40.3% of the total respondents);
- Medium size companies with from 51 to 300 employees (49 companies, corresponding to 34%);
- Large size companies with more than 300 employees (37 companies, corresponding to 25.7%).

4.4. Measurement Test

- *Reliability*: From the results (Appendix A), the Cronbach's Alpha values of all constructs in this study exceed the suggested threshold of 0.6 [82]. Cronbach's Alpha values of QM constructs range from 0.730 to 0.888. Cronbach's Alpha values of SP constructs range from 0.613 to 0.871 (see more details in Appendix A). As such, it can be concluded that the reliability of all constructs is confirmed.
- *Content validity*: Content validity of the questionnaire is confirmed by extensive review of previous literature on QM practices and SP. Tables 3 and 4 show numerous empirical studies that support the utilization of measurement constructs in this study. It can be seen that content validity of measurement instrument in this study is demonstrated.
- *Convergent validity*: The question items in this study are mainly adopted from previous studies which were thoroughly tested and confirmed the reliability and validity. Therefore, convergent validity in this study is tested by confirmatory factor analysis or within scale factor analysis. In this study, factor analysis is conducted with Maximum likelihood method and Promax rotation. Criteria for factor analysis are: KMO (Kaiser-Mayer-Olkin) and Bartlett's Test values which measure sampling adequacy need to be greater than 0.5 with Sig. value smaller than 0.5; each factor is uni-dimensional with a minimum eigenvalue of 1; and factor loading of each item is greater than 0.4. In this study, the factor analysis results for QM practices satisfy all of these requirements for the original constructs; factor loadings of QM practices range from 0.468 to 0.903. The factor analysis of SP breaks the original three constructs of SP into seven sub-constructs: Economic return, Cost reduction, and Market performance belong to Economic performance construct; Emission reduction and Resource consumption belong to Environmental performance; and Internal social performance (refers to social performance that has impact on internal stakeholders) and External social performance (refers to social performance that has impact on external stakeholders) belong to Social performance. The factor analysis results for these seven sub-constructs of SP satisfy all validity requirements by ranging from 0.429 to 0.925.

Table 3. Definition of QM measurement constructs and supporting literature.

Constructs	Definition/Description	Supported Literature
Top Management Support for QM	This construct measures how top management involves and supports for quality-related goal-setting and issues.	[12,14,21,23,24,32,35,36,51,54,63,65,83,84]
Training on Quality	This construct measures whether the organization provides quality-related training throughout the organization	[17,23,27,28,35,39,49,63,83–85]
Product/Service Design	This construct measures how quality is emphasized in the product/service design process to ensure that product/service could meet customers' requirements.	[12,17,22,23,26,29,30,51,52,54–56,71,84]
Quality Data and Reporting	This construct measures whether quality-related data are available and ready for managers and employees	[12,17,29,31,35,65]
Process Management	This scale evaluates how the organization manages process related issues such as process objectives, authority and responsibility for process management, process risks, and process standardization to achieve the overall outcome of QM system	[14,15,22,23,26,31,32,35,36,49–55,84]
Continuous Improvement	This scale measures whether people in the organization are constantly looking for continuous improvement while doing their works	[21,27,31,32,34–36,50,54,75]
Problem Solving	This scale measures whether problem solving teams contribute to performance improvement.	[12,54,63,83,86]
Rewards	This scale evaluates whether managers or staff of the organization are rewarded with they contribute to quality improvement	[12,41,78,87,88]

Table 4. Definition of SP measurement constructs and supporting literature.

Constructs	Definition/Description	Supported Literature
Economic performance	This scale measures the performance change of the organization in terms of financial return, financial expense, and market expansion	[44,81]
Environmental performance	This scale measures the performance change of the organization in terms of waste emitted to the environment, and consumption of natural resources	[44,81]
Social performance	This scale measures the performance change of the organization in terms of human-related management and contribution to local community	[44,81]

5. Data Analysis and Hypotheses Testing

5.1. The Impact of QM Practices on Sustainability Performance

In this section, Hypotheses on the impact of QM practices on SP will be tested.

Hypothesis (1a): *QM practices positively impact on economic performance.*

Hypothesis (1b): *QM practices positively impact on environmental performance.*

Hypothesis (1c): *QM practices positively impact on social performance.*

Prior to testing hypotheses by regression analysis, correlation analysis was conducted to check correlations among quality management practices. As shown in Table 5, the eight QM practices are significantly correlated with each other. The correlation coefficients ranged from 0.404 to 0.676 (significant at 5%). The results raise a possibility of multicollinearities among independent variables which affect the results of the regression analysis. Therefore, in this study, the Variance Inflation Factor (VIF) values were calculated to examine this possibility. Values of VIF in Table 6 are all smaller than the threshold of 4 (the acceptable VIF value), indicating that multicollinearities do not have an undue effect on regression results.

Table 5. Correlations among QM practices.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Top Management Support for QM	0.644	-	-	-	-	-	-	-
(2) Training	0.662 **	0.681	-	-	-	-	-	-
(3) Product/Service Design	0.578 **	0.532 **	0.685	-	-	-	-	-
(4) Quality Data and Reporting	0.589 **	0.649 **	0.590 **	0.672	-	-	-	-
(5) Process Management	0.564 **	0.557 **	0.648 **	0.646 **	0.717	-	-	-
(6) Continuous Improvement	0.593 **	0.669 **	0.608 **	0.612 **	0.659 **	0.789	-	-
(7) Problem Solving	0.556 **	0.544 **	0.661 **	0.608 **	0.676 **	0.676 **	0.852	-
(8) Rewards	0.404 **	0.480 **	0.543 **	0.445 **	0.467 **	0.564 **	0.516 **	0.836

Note: ** significant at 1%; * significant at 5%, square root of the Average Variance Extracted (AVE) values are at the diagonal line.

Table 6. Regression analysis on the impact of QM practices on SP.

	Economic			Environmental		Social		VIF
	Return	Cost Reduction	Market Perf.	Emission Reduction	Resource Consumption Reduction	Internal Social Perf.	External Social Perf.	
R	0.49	0.35	0.52	0.21	0.39	0.53	0.60	-
R2	0.25	0.12	0.27	0.04	0.15	0.28	0.36	-
df	117	117	117	117	117	117	117	-
Sig.	0.00	0.05	0.00	0.74	0.01	0.00	0.00	-
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	
Constant	2.13	2.48	1.92	2.97	4.23	1.40	1.68	-
TOPQ	-0.15	0.18	0.09	-0.04	-0.17	0.30 **	0.08	2.220
TRAIN	0.26 **	-0.32 **	0.11	-0.08	-0.22	-0.11	0.19 **	2.638
DEGN	0.32 **	-0.12	0.15*	0.18	0.15	0.13	0.16 **	2.460
QDAT	-0.02	0.44 **	0.03	0.06	0.39 **	-0.12	0.03	2.327
PCMT	0.02	-0.27 **	-0.05	0.02	-0.10	0.21 *	0.03	2.725
CONTI	0.08	0.00	0.21 **	-0.22	-0.15	0.12	0.21 **	2.848
PROB	-0.27 **	0.17	0.08	0.10	0.01	0.02	0.00	2.517
REW	0.17 **	0.06	0.02	0.08	-0.23 **	0.05	0.00	1.645

Note: * significant at 10%; ** significant at 5%; *** significant at 1% (1-tailed test). TOPQ: Top management support for QM; TRAIN: Training on quality; DEGN: Product/service design; QDAT: Quality data and reporting; PCMT: Process management; CONTI: Continuous improvement; PROB: Problem solving; and REW: Rewards.

Regression analysis was adopted to investigate the relationship between QM practices and SP and test the H1a, H1b, and H1c hypotheses. Seven multiple regression models were established where the independent variables are the eight constructs of QM practices: Top management support for QM, Training on quality, Product/service design, Quality data and reporting, Process management, Continuous improvement, Problem solving, and Rewards; and dependent variables for each model are Economic return, Cost reduction, Market performance, Emission reduction, Resource consumption reduction, Internal social performance, and External social performance. Regression analysis results are presented in Table 6.

In general, QM practices have statistically significant impact on economic performance in terms of economic return, cost reduction, and market performance; on environmental performance in terms of resource consumption reduction; and social performance in terms of internal and external social performance at 5% significant level. Meanwhile, QM practices do not show a statistical effect on emission reduction (significant value of this regression model is 0.74).

1. The impact of QM practices on *Economic return*: In Table 5, R-square is 0.25 indicating that these QM practices would explain 25% of the variance in economic return. Among eight QM practices, the impact of Training on quality, Product/service design, Problem solving, and Rewards on economic return are significant at 5% confident interval while the other QM practices reveal

no statistically significant impact on economic return. Product/service design shows the most significant impact on economic return with the highest beta coefficient value of 0.32. Following this are Training and Rewards with positive coefficient values of 0.26 and 0.17, respectively, and Problem solving with a negative coefficient value of -0.27 .

2. The impact of QM practices on *Cost reduction*: R-square of this regression model is 0.12, indicating that these QM practices would explain 12% of the variance in cost reduction. Among eight QM practices, Training on quality, Quality data and reporting, and Process management illustrate significant effect on cost reduction at 5% confident interval, whereas the other practices have no statistically significant impact. Quality data and reporting presents the most significant impact on cost reduction with the highest beta coefficient value of 0.44. Training on quality and Process management follow with strong but negative impact with coefficient values of -0.32 and -0.27 , respectively.
3. The impact of QM practices on *Market performance*: R-square of this regression model is 0.27, indicating that these QM practices would explain 27% of the variance in market performance. Continuous improvement shows the most significant impact on market performance with a beta coefficient of 0.21 (at 5% confident interval), followed by Product/service design with beta coefficient of 0.15 (at 10% confident interval). The other QM practices do not show statistically significant impact on market performance.
4. The impact of QM practices on *Resource consumption reduction*: R-square of this regression model is 0.15, indicating that QM practices would explain 15% of the variance in resource consumption reduction. Among eight QM practices, Quality data and reporting and Rewards illustrate a statistically significant impact on resource consumption reduction but in opposite directions. Quality data and reporting presents a positive impact with a beta coefficient of 0.39, while Rewards shows a negative one with beta coefficient of -0.23 .
5. The impact of QM practices on *Internal social performance*: R-square of this model is 0.28, indicating that these QM practices would explain 28% of the variance in internal social performance. Among QM practices, Top management support for QM plays the most important role with the highest beta coefficient of 0.30 (significant at 5%). In addition, Process management has a smaller influence with a coefficient of 0.21 (significant at 10%). The other QM practices do not show a statistically significant impact on internal social performance.
6. The impact of QM practices on *External social performance*: R-square of this model is 0.36, indicating that these QM practices would explain 36% of the variance in external social performance. Among eight QM practices, Training on quality, Product/service design, and Continuous improvement show statistically impact on external social performance (significant at 5%). Continuous improvement has the strongest influence with a beta coefficient of 0.21, followed by Training on quality and Product/service design with beta coefficients of 0.19 and 0.16, respectively.

In summary, QM practices statistically affect sustainability performance, even though different practices show different impacts on dimensions of sustainability performance. As the results indicated, Hypothesis H1a regarding the impact of QM practices on economic performance could not be rejected for four practices: product/service design, quality data and reporting, continuous improvement, and rewards. Hypothesis H1b regarding the impact of QM practices on environmental performance could not be rejected for Quality data and reporting practices. Hypothesis H1c regarding the impact of QM practices on social performance could not be rejected for top management support for quality management, training on quality, product/service design, process management, and continuous improvement.

5.2. Timeline Effect on QM Practices

In this section, Hypotheses on the effects of QM experience time on the relationship between QM practices and SP will be tested.

Hypothesis (2a): *Companies with shorter QM experience time have higher level of QM practices implementation than the ones with longer time experience.*

Hypothesis (2b): *Companies with shorter QM experience time see more significant impact of QM practices on SP than the ones with longer time experience.*

To test the Hypothesis H2a, One-way ANOVA test with Turkey pairwise comparison technique is conducted to compare QM practices implementation level across three groups: *Group T1*: Less than 5 years with 38 companies; *Group T2*: From 5 to 10 years with 35 companies; and *Group T3*: More than 10 years with 29 companies.

The analysis result (Appendix B) shows that there is no significant difference across three groups. Hypothesis H2a is rejected.

To test the Hypothesis H2b, regression analysis with pool sample is conducted with dummy variables for Group T2 (From 5 to 10 years) and Group T3 (More than 10 years) to compare the difference between Group T2 and Group T3 (longer QM implementation experience timeline) with Group T1. Analysis results show that QM practices have significantly different impact on economic return and social performance across three groups (see Table 7).

Regarding economic return, Group T2 experienced weaker impact of Training on quality (coefficient of -0.818) but stronger impact of Product/service design (coefficient of 0.615) compared to Group T1, and Group T3 experienced stronger impact of Continuous improvement (coefficient of 0.622) compared to Group T1.

About social performance, Top management support for quality, Training on quality, and Process management show weaker impact in Group T2 (with coefficients of -0.713 , -0.773 , and -0.705 , respectively) in comparison to Group T1 whereas Continuous improvement indicate stronger impact in both Group T2 and T3 compared to Group T1 (with coefficients of 0.926 and 0.872 , respectively).

In summary, as the results indicated, there is no significant difference in QM implementation level across three groups, it can be concluded that Hypothesis 2a is rejected. With respect to the difference in the impact of QM practices on SP, the results are mixed: Group T1 with less than 5-year experience time recognized stronger influence of Top management support for quality, Training on quality, and Process management than Group T2 with longer experience time. Meanwhile, Product/service design and Continuous improvement have stronger effect in groups with more than 5-year experience than in Group T1. Therefore, Hypothesis H2b could not be rejected with three practices: Top management support for quality, Training on quality, and Process management. As such, it can be stated that there are some significant differences in the impact of QM practices on sustainability performance across three groups with different QM experience time.

Table 7. The impact of QM practices on SP among different timeline groups.

	Economic			Environmental		Social	
	Return	Cost Reduction	Market Perf.	Emission Reduction	Resource Consumption Reduction	Internal Social Perf.	External Social Perf.
R	0.68	0.61	0.70	0.57	0.54	0.65	0.70
R2	0.46	0.37	0.49	0.32	0.29	0.42	0.48
Adjusted R2	0.25	0.12	0.29	0.06	0.02	0.20	0.28
df	67	67	67	67	67	67	67
Sig.	0.005	0.099	0.002	0.245	0.402	0.021	0.002
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
(Constant)	2.621	2.770	0.607	0.845	3.478	0.568	1.666
T2	−0.926	−0.916	2.388	1.596	0.563	1.895	0.321
T3	0.305	−1.416	0.168	2.817	−0.916	1.286	−0.242
TOPQ	−0.005	−0.349	0.216	−0.248	−0.668	0.706	−0.160
TRAIN	0.580	−0.086	0.173	0.106	−0.060	0.153	0.566
DEGN	−0.112	−0.026	0.382	0.343	0.131	−0.258	−0.215
QDAT	−0.183	0.301	−0.098	0.398	0.615	−0.201	−0.139
PCMT	0.337	−0.358	0.039	−0.183	0.092	0.378	0.597
CONTI	−0.299	−0.029	0.025	−0.068	−0.049	0.122	−0.365
PROB	−0.176	0.675	0.056	0.155	0.009	−0.181	−0.009
REW123	0.230	−0.050	0.032	0.114	−0.159	0.113	0.332
T2xTOPQ	−0.075	0.345	−0.400	−0.300	0.852	−0.713 **	0.315
T2xTRAIN	−0.818 **	−0.341	−0.073	−0.363	−0.619	−0.548	−0.773 ***
T2xDEGN	0.615 **	−0.113	0.018	0.313	−0.026	0.284	0.458
T2xQDAT	0.466	0.684	0.403	−0.056	−0.362	0.428	0.154
T2xPCMT	−0.424	0.199	−0.108	0.575	−0.080	−0.506	−0.705 **
T2xCONTI	0.290	−0.616	−0.044	−0.947	0.157	0.166	0.926 ***
T2xPROB	−0.069	−0.123	−0.269	0.398	0.180	0.427	−0.279
T2xREW	0.169	0.224	−0.100	0.028	−0.326	−0.018	−0.264
T3xTOPQ	−0.388	0.958	0.282	0.469	0.821	−0.653	0.206
T3xTRAIN	0.273	−0.726	−0.425	−0.561	−0.237	−0.230	−0.614
T3xDEGN	0.313	0.451	−0.369	0.068	0.515	0.266	0.193
T3xQDAT	−0.141	−0.275	0.267	−0.902	−0.338	0.221	0.090
T3xPCMT	0.105	−0.038	−0.218	0.526	−0.314	−0.277	−0.352
T3xCONTI	0.622 **	0.154	0.088	0.490	−0.053	−0.116	0.872 ***
T3xPROB	−0.601	−0.380	0.162	−0.552	−0.340	0.194	−0.035
T3xREW	−0.354	0.121	0.082	−0.265	0.052	0.243	−0.408

Note: T2: From 5 to 10 years; T3: More than 10 years; TOPQ: Top management support for QM; TRAIN: Training on quality; DEGN: Product/service design; QDAT: Quality data and reporting; PCMT: Process management; CONTI: Continuous improvement; PROB: Problem solving; and REW: Rewards. * significant at 10%; ** significant at 5%; *** significant at 1% (2-tailed test).

5.3. Industrial Effect on QM Practices

In this section, hypotheses on the effects of type of industry on the relationship between QM practices and SP will be tested.

Hypothesis (3a): *There are significant differences in level of QM practices implementation across groups with different types of industry.*

Hypothesis (3b): *There are significant differences in the impact of QM practices on SP across groups with different types of industry.*

To test Hypothesis H3a, One-way ANOVA test with Turkey pairwise comparison technique is conducted to compare QM practices implementation level across four groups based on type of industry: Group I1: Industrial; Group I2: Consumer goods; Group I3: Basic materials; and Group I4: Consumer services. The analysis result (in Appendix C) shows that there is no significant difference across four groups. Hypothesis H3a is rejected.

To examine the differences in QM implementation among four type of industry groups, regression analysis with pool sample is conducted with dummy variables for Group I2 (Consumer goods), Group I3 (Basic materials), and Group I4 (Consumer services) to compare the difference between Group I2, Group I3 and Group I3, and Group I1 (see Table 8). Analysis results show that Group I1 (Industrial) experienced significantly different impact of QM practices on economic return, cost reduction, internal and external social performance (significant at 5% level) but no different impact on market performance and environmental performance, compared to the other three type-of-industry groups. With respect to *economic* return, the impact of Product/service design is weaker in the basic materials group compared to industrial group (with coefficient of -0.300 significant at 1%). Regarding *cost reduction* performance, the consumer goods group experiences weaker impact of process management than the industrial group (with coefficient of -0.543 , significant at 10%). In addition, the consumer services group sees stronger impact of Product/service design (coefficient of 0.299 significant at 10%) but weaker influence from Rewards (coefficient of -0.150 significant at 10%) compared to the industrial group. Regarding internal and external social performance, the effect of Product/service design on internal social performance is weaker in the consumer services group (coefficient of -0.386 significant at 1%), the effect of Process management on external social performance is weaker in the basic materials group (coefficient of -0.300 significant at 1%), compared to the industrial group.

In summary, as the results indicated, there is no significant difference in QM implementation level across four different industrial groups; thus, Hypothesis H3a is rejected. With respect to the difference in the impact of QM practices on SP, it can be stated that there are significant differences in the impact of QM practices on economic, environmental and social performance across four type of industry groups. As such, Hypothesis H3b cannot be rejected.

Table 8. Regression analysis on the impact of QM practices on SP across four type of industry groups with dummy variables.

	Economic			Environmental		Social	
	Return	Cost Reduction	Market Perf.	Emission Reduction	Resource Consumption Reduction	Internal Social Perf.	External Social Perf.
R	0.67	0.63	0.64	0.48	0.60	0.67	0.73
R2	0.44	0.40	0.41	0.23	0.36	0.45	0.54
Adjusted R2	0.23	0.17	0.18	-0.06	0.11	0.24	0.36
df	88	88	88	88	88	88	88
Sig.	0.004	0.022	0.015	0.783	0.096	0.002	0.000
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
(Constant)	2.115	2.066	3.005	3.374	4.460	2.101	2.065
I2	0.242	0.313	-0.953	0.629	0.285	-0.605	-0.425
I3	-0.049	0.103	-0.070	-0.283	0.526	0.023	-0.332
I4	0.534	0.073	-0.615	-0.434	-0.311	0.097	-0.290
TOPQ	-0.079	-0.097	-0.075	-0.118	-0.434	0.059	0.010
TRAIN	0.205	-0.359	0.149	-0.005	0.019	0.102	0.085
DEGN	0.583	-0.045	0.137	-0.105	0.095	0.213	-0.043
QDAT	-0.174	0.451	0.069	-0.082	0.159	-0.168	-0.030
PCMT	-0.223	-0.095	-0.191	0.236	-0.001	0.083	0.138
CONTI	.104	-0.071	0.148	0.043	-0.150	0.002	0.362
PROB	-0.362	0.329	-0.033	-0.153	0.160	0.104	-0.163
REW	0.345	0.144	0.045	0.169	-0.211	0.065	0.078
I2xTOPQ	-0.212	0.098	0.088	-0.123	0.122	0.028	-0.018
I2xDEGN	-0.209	0.303	-0.357	0.223	0.084	-0.012	0.232
I2xQDAT	0.087	0.104	-0.159	-0.299	0.143	-0.063	0.092
I2xPCMT	0.198	-0.543 *	0.235	-0.210	-0.522	0.063	-0.089
I2xCONTI	0.228	-0.333	0.068	-0.208	0.436	0.333	0.084
I2xPROB	0.091	0.225	0.227	0.403	-0.375	-0.250	-0.116
I2xREW	-0.204	0.077	0.099	0.091	0.013	0.00	-0.089
I3xTOPQ	0.078	0.320	-0.086	0.161	0.130	0.118	0.182
I3xTRAIN	0.154	-0.067	0.155	-0.029	-0.143	-0.119	0.047

Table 8. Cont.

	Economic			Environmental		Social	
	Return	Cost Reduction	Market Perf.	Emission Reduction	Resource Consumption Reduction	Internal Social Perf.	External Social Perf.
I3xDEGN	−0.300 ***	−0.175	−0.006	0.062	−0.037	−0.019	−0.026
I3xQDAT	0.059	0.017	−0.087	0.016	0.130	0.053	0.043
I3xPCMT	−0.046	−0.096	0.129	−0.205	−0.160	0.014	−0.30 ***
I3xCONTI	0.008	0.102	0.031	−0.106	−0.075	0.023	−0.053
I3xPROB	0.085	−0.169	−0.054	0.196	0.052	−0.008	0.130
I3xREW	−0.028	0.008	−0.070	−0.035	−0.036	−0.066	0.039
I4xTOPQ	0.096	0.041	−0.002	0.014	0.007	0.147	−0.128
I4xTRAIN	−0.032	0.057	−0.018	−0.129	−0.165	−0.114	0.074
I4xDEGN	−0.120	0.299 *	0.047	0.243	0.198	−0.39 ***	0.086
I4xQDAT	0.037	−0.220	0.074	0.263	0.102	0.212	0.002
I4xPCMT	0.121	−0.002	0.073	0.045	0.143	0.099	0.030
I4xCONTI	−0.121	−0.024	−0.041	−0.081	0.045	−0.034	−0.118
I4xPROB	−0.018	−0.052	−0.002	−0.133	−0.209	0.014	0.107
I4xREW	−0.088	−0.150 *	0.014	−0.119	−0.045	0.059	0.037

Note: I2: Consumer goods; I3: Basic materials; I4: Consumer services; TOPQ: Top management support for QM; TRAIN: Training on quality; DEGN: Product/service design; QDAT: Quality data and reporting; PCMT: Process management; CONTI: Continuous improvement; PROB: Problem solving; and REW: Rewards. * significant at 10%; ** significant at 5%; *** significant at 1% (2-tailed test).

5.4. Size Effect on QM Practices

In this section, the effect from firm size on the QM practices will be tested with following hypotheses:

Hypothesis (4a): *There are significant differences in level of QM practices implementation across groups with different firm size.*

Hypothesis (4b): *There are significant differences in the impact of QM practices on SP across groups with different firm size.*

To test Hypothesis H4a, one-way ANOVA test with Turkey pairwise comparison technique is conducted to compare QM practices implementation level across three groups: Small: Small size with no more than 50 employees; Medium: Medium size companies with from 51 to 300 employees; and Large: Large size companies with more than 300 employees. The analysis results show that there are significant differences across three groups in the Process management and Continuous improvement practices. In addition, there are significant differences between medium and large size companies in terms of Quality data and reporting practice, and between small and large size companies in terms of Rewards practice. For all differences, larger organizations reported higher implementation level compared to smaller ones (see Appendix D).

To compare the impact of QM practices on SP across three groups, regression analysis with pool sample is conducted with dummy variables for Group Medium size and Group Large size organizations to compare the difference between Group Medium and Group Large size organizations with Group Small size ones (see Table 9). Analysis results show that Small size group experienced significantly different impact of QM practices on economic performance in terms of economic return and cost reduction, on environmental performance in terms of resource consumption reduction, and on both internal and external social performance (significant at 5% level), compared to the Medium and Large size groups.

With respect to economic return, Medium size companies experience weaker impact of Process management (coefficient of −0.651 significant at 5%) but stronger impact of Continuous improvement (coefficient of 0.629 significant at 5%), compared to Small size companies. Moreover, the effect of

Problem solving in both the Medium and Large size companies is weaker compared to the Small size group (coefficient of -0.436 and -0.919 , respectively).

Regarding cost reduction, the influence of Top management support for QM in both the Medium and Large size groups is stronger than in the Small size group (with coefficient of 1.068 and 0.930 , respectively, significant at 5%). The impact of Problem solving in the Medium size group, however, is weaker compared to the Small size group (coefficient of -0.604 significant at 10%).

Regarding resource consumption reduction, the Medium size group experiences stronger impact of Top management support for QM (coefficient of 0.817 significant at 5%) while weaker impact of Training on quality (coefficient of -0.710 significant at 10%) compared to the Small size group. Moreover, the effect of Problem solving in both the Medium and Large size groups is weaker than the Small size group (with coefficients of -0.602 and -0.981 , respectively).

Table 9. Regression analysis on the impact of QM practices on SP across three different firm size groups with dummy variables.

	Economic			Environmental		Social	
	Return	Cost Reduction	Market Perf.	Emission Reduction	Resource Consumption Reduction	Internal Social Perf.	External Social Perf.
R	0.69	0.544	0.604	0.372	0.556	0.656	0.715
R2	0.48	0.296	0.364	0.138	0.309	0.430	0.511
Adjusted R2	0.34	0.111	0.198	-0.088	0.128	0.281	0.382
df	99	99	99	99	99	99	99
Sig.	0.000	0.052	0.003	0.925	0.033	0.000	0.000
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
(Constant)	0.704	3.418	2.256	2.556	3.727	-0.565	1.634
M	0.647	-1.111	-0.862	-0.101	0.952	2.138	-0.644
L	2.370	-2.114	-0.901	0.441	-1.610	1.926	-0.426
TOPQ	-0.078	-0.431	0.044	-0.202	-0.614	0.460	-0.244
TRAIN	0.471	-0.255	0.294	-0.023	0.089	0.237	0.398
DEGN	0.214	-0.027	0.021	-0.094	0.268	0.036	0.104
QDAT	-0.179	0.672	-0.023	0.127	0.666	-0.243	0.103
PCMT	0.268	-0.367	-0.089	0.075	-0.406	0.459	0.045
CONTI	-0.318	-0.099	0.082	-0.511	-0.220	-0.103	0.072
PROB	0.140	0.491	0.091	0.558	0.538	0.199	0.067
REW	0.295	-0.048	0.004	0.307	-0.466	0.074	0.048
MxTOPQ	0.183	1.07 **	-0.011	0.433	0.817 **	-0.071	0.356
MxTRAIN	-0.401	-0.061	-0.340	0.099	-0.710 *	-0.458	-0.374 *
MxDEGN	0.312	-0.391	0.057	0.246	-0.498	0.295	-0.222
MxQDAT	0.217	-0.324	0.184	-0.247	-0.171	-0.075	-0.088
MxPCMT	-0.651 **	0.168	0.079	-0.197	0.249	-0.366	0.020
MxCONTI	0.629 **	0.156	0.330	0.278	0.121	0.251	0.317
MxPROB	-0.436 *	-0.604 *	-0.128	-0.470	-0.602 *	-0.106	0.110
MxREW	-0.099	0.196	0.036	-0.184	0.487	-0.080	-0.018
LxTOPQ	-0.507	0.930 **	0.433	-0.074	0.481	-0.088	0.599 **
LxTRAIN	0.565	-0.552	-0.550	0.005	0.067	-0.621	-0.717 *
LxDEGN	0.049	0.022	0.126	0.720	0.235	0.110	0.157
LxQDAT	0.135	-0.078	0.081	-0.006	-0.407	0.291	-0.085
LxPCMT	-0.099	-0.022	0.207	0.220	0.318	-0.308	0.231
LxCONTI	0.257	-0.168	0.149	0.437	0.515	0.611	0.297
LxPROB	-0.919 ***	0.194	-0.464	-0.938	-0.981 **	-0.67 **	-0.512 **
LxREW	-0.108	0.154	0.153	-0.514	0.023	0.112	0.028

Note: M: Medium size; L: Large size; TOPQ: Top management support for QM; TRAIN: Training on quality; DEGN: Product/service design; QDAT: Quality data and reporting; PCMT: Process management; CONTI: Continuous improvement; PROB: Problem solving; and REW: Rewards. * significant at 10%; ** significant at 5%; *** significant at 1% (2-tailed test).

With social performance, data for the Large size group presented stronger impact of Top management support for QM (coefficient of 0.599 significant at 5%) but weaker impact of Problem solving (coefficient of -0.670 on internal social performance and 0.512 on external social performance, significant at 5%). Furthermore, both the Medium and Large size groups are under weaker effect from

Training on quality compared to Small size group (with coefficients of -0.374 and -0.717 , respectively, significant at 10%).

In summary, as the results indicated, there are some significant differences in QM implementation level across three different size groups; thus, Hypothesis H4a cannot be rejected. With respect to the difference in the impact of QM practices on SP, it can be stated that there are significant differences in the impact of QM practices on economic return, Cost reduction, Resource consumption reduction, and Internal and External social performance across three groups. As such, Hypothesis H4b cannot be rejected.

6. Findings and Discussions

The analysis results show that QM practices have significant impacts on dimensions of sustainability performance. It appears that QM practices have more significant impacts on economic performance and social performance, followed by environmental performance. Statistically significant impacts of QM practices are recognized on all three sub-constructs of economic performance, including Economic return, Cost reduction, and Market performance, and two sub-constructs of social performance, comprising Internal social performance and External social performance. Regarding environmental performance, the impact of QM practices is significant on Resource consumption reduction but insignificant on Emission reduction. A possible explanation for insignificant influence of QM practices on Emission reduction might be that QM focuses on eliminating wastes of inefficient processes rather than reducing pollution in form of emissions [4]. Therefore, one suggestion to better address the environmental issues is to integrate QM with environmental management system, as exemplified by ISO 9001 and ISO 14001 integration [61].

QM practices have mixed impact on economic and environmental performance while have positive impact on social performance. Some QM practices show mixed impact on different dimensions of SP such as *Training on quality*, *Rewards*, and *Process management*. When organizations provide more training, they attain higher economic return, but have to exert higher cost. Offering more Rewards to employees seems to motivate them to bring back more return but also consume more resources. Rigorous Process management costs more, but would improve internal social performance of the organization. Inconclusive results about the effect of QM practices on different aspect of performance have been found in the literature. For example, Baird et al. [26] shows that Process management has a significant impact on inventory performance but insignificant impact on quality performance. Meanwhile, Zehir et al. [36] found that process management indicates a significant impact on quality performance but insignificant effect on innovative performance. These facts would be understood as a trade-off of benefits among three aspects of the triple bottom line [46]. This argument is supported by [89,90].

From the analysis results, four QM practices are identified with an overall contribution to three dimensions of sustainability performance: *Top management support for QM*, *Product/service design*, *Quality data and reporting*, and *Continuous improvement*. The impact of these practices on SP does not include negative one which implies that these practices do not lead to a sacrifice of any performance aspect. These practices would be considered as critical factors for the possibility of win-win scenario of the triple bottom line. The contributions of these practices are also highlighted in the literature. For instance, the roles of Top management support [14,39,65]; Product/service design [12,30,73]; Quality data and reporting [14,63]; and Continuous improvement [23,71].

In the comparison between company groups with different QM experience time, it is interesting that the implementation levels of QM practices are somehow homogeneous among three groups regardless of experience time. This would be explained by the fact of labor market in Vietnam in which turn-over rate is rather low. Employees in Vietnamese companies usually change their jobs around every 3–5 years. Therefore, the differences due to experience timeline may not be clearly recognized in the context of Vietnamese enterprises. Regarding the differences in the impact of QM practices on SP across three groups, it appears that the effect of *Training on quality*, *Top management support for QM* and

Process management on SP in longer QM experience time companies is less significant. This finding supports the hypothesis of this study that companies with shorter QM experience time (less than five years) see more significant impact of QM practices on SP than the ones with longer time experience. The finding seems to be consistent with other research [74] which found that employee training and process control have the strongest effect in group with 2–5-year QM experience. Another finding is that the impact of *Continuous improvement* on SP in longer experience time companies is more significant (especially on social performance). The result may be explained by the fact that effect of continuous improvement needs long time to be recognized.

Regarding the contextual effects of type of industry on QM implementation, the study found insignificant difference in the level of QM implementation across four type of industry groups. That means four examined type of industry groups have relatively homogenous attention to and investment in QM practices. Sila [80] presented supported finding with similar level of TQM implementation across subgroups with different scope of operations. The impacts of QM practices on SP, however, are significantly different across four type of industry subgroups. For example, it appears that the Industrial group experienced stronger impact from Process management on cost reduction compared to Consumer goods as well as stronger impact from Product/service design on economic return compared to Basic materials group. It seems possible that these results are due to the nature of different types of industry. For instance, Industrial firms are characterized with more standardized processes with rigorous process management. Consumer goods firms usually have a variety of product lines with smaller lots. Therefore, process management in the industrial group would better lead to cost reduction than that in the consumer goods group. Another characteristic is that industrial firms usually require well-design products for mass production whereas basic materials organizations such as mining, metal processing with unstandardized products are usually not required much product design. Thus, good product/service design would bring back industrial firms higher economic return compared to the basic materials companies. The significant moderating effects from industry have been highlighted in Singaporean firms [77], and Queensland businesses [79].

With respect to the effect of firm size on QM implementation, the study found some significant differences in terms of QM practices implementation level such as *Quality data and reporting*, *Process management*, *Continuous improvement*, and *Rewards* in which Larger size organizations reported higher implementation level. It is likely that larger firms have larger resources as well as spend considerable investment in QM practices implementation. The impacts of QM practices on SP, furthermore, are also significantly different among three groups. Generally, it seems Medium and Large size organizations saw stronger impact of Top management support for QM on SP, but weaker influence of Problem solving on SP, compared to Small size group. The former may be explained by the huge resources and capabilities of the larger size organizations which Top management would support for QM activities. These supports result in higher performance in larger organizations compared to smaller ones. The latter would be understandable by the characteristic of Small size organization with less number of employees, problem solving practices would be easier to be controlled, and would be a source of better performance than the larger size firms. The differences in QM implementation affected by firm size have been emphasized in Singaporean firms [77], Queensland businesses [79], and Chinese firms [78].

7. Conclusions

This paper empirically investigates how quality management practices impact on sustainability performance as well as how this relationship is moderated by QM experience time, type of industry, and firm size. Analysis of Variance (ANOVA) and regression techniques were used to test the hypotheses. The study showed mixed impacts of eight QM practices on different dimensions of sustainability performance. Especially, the results found four QM practices that have significantly positive impact on SP: Top management support for Quality management, Design for quality, Quality data and reporting, and Continuous improvement. These practices could be considered as critical success factors for QM implementation. Regarding the level of QM practices implementation, there are some significant

differences across groups with different firm size, but insignificant difference is revealed among groups categorized by QM experience time and type of industry. Besides, the impacts of QM practices on SP are significantly different across groups with different QM experience time, type of industry, and firm size.

This study enriches the QM and sustainability literature by proposing and validating measurement instruments of QM practices and sustainability performance, as well as offering empirical evidence for the relationship between QM practices and sustainability performance in the context of a developing country. Besides, from the results and discussions in this paper, managers and stakeholders in Vietnam are provided insights into the contribution of excellent business management models, particularly quality management system, to obtaining sustainability goals.

Although the study has some contributions to the literature and practices, it is important to view the study from a perspective of its limitations. Methodologically, the study suffers a similar limitation to many empirical studies due to survey based subjective. The study collects cross-sectional data by self-reported questionnaire which comprises question items regarding both practices and performance evaluating based on a five-point Likert scale. Although the author tried to address the issue of bias by asking for multiple respondents from each organization, perceptual and individual bias may still exist. There is a tendency for respondents to overestimate items that are higher social desirability to them, and possibly underestimate items that are less social desirability to them [91]. This limitation would be somehow overcome by adding more objective question items.

The second limitation relates to the measure of QM practices. The measurements of QM practices are adopted from previous studies that mainly examined QM practices in the manufacturing context. Although the author also referenced some studies possibly applying in service context, and customized the question items for more appropriate evaluation in a cross-sectional context, demographic characteristics of respondents in this study show some industrial bias with more manufacturing based respondents. The reason is that fourteen responses that were rejected due to many missing variables are mainly service-based organizations. Future research would overcome this limitation by designing different questionnaires based on different industrial characteristics and collect data from a larger sample size.

The third limitation relates to the measure of SP. It is difficult to measure SP because it requires a long-term performance report. To address this issue, the question items on SP are evaluated based on the performance change in the recent two years. Future studies should consider collecting longitudinal data to improve explanation power to the relationship related to SP.

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Appendix A. Questionnaire Items and Measurement Test Results

Question Items	Factor Loading
Top Management Support for Quality Management (Alpha = 0.730; KMO = 0.740; Eigenvalue = 2.222, % of Variance = 55.557)	
Our organization has a comprehensive goal-setting process for quality	0.6
We always review of quality issues in top management meetings	0.661
Our top management considers quality improvement as a way to increase profits	0.769
All major department heads within our company accept their responsibility for quality	0.521
* Department heads provide personal leadership for quality products and quality improvement	-
* Department heads communicates a vision focused on quality improvement	-
Training on Quality (Alpha = 0.836; KMO = 0.773; Eigenvalue = 3.311; % of Variance = 55.188)	
We provide specific work-skills training to employees throughout the organization.	0.815
We provide quality-related training to hourly employees throughout the organization.	0.815
We provide quality-related training to managers and supervisors throughout the organization.	0.709
We provide training on the "total quality concept" (i.e., philosophy of company-wide responsibility for quality) throughout the organization.	0.558
Our employees receive training and development in workplace skills on a regular basis.	0.595
Management at our company believes that continual training and upgrading of employee skills is important	0.535
Design for Quality (Alpha = 0.802; KMO = 0.784; Eigenvalue = 2.849; % of Variance = 56.983)	
* Quality of new products is emphasized in relation to cost or schedule objectives.	-
* In the design process, we make an effort to list only the specifications that are really needed.	-
We work in teams, with members from a variety of areas, to introduce new products	0.683
We design for producibility	0.674
New product designs are thoroughly reviewed before the product is produced	0.748
Customer requirements are thoroughly analyzed in the new product design process	0.78
In product development, we emphasize the importance of offering products that are distinctive.	0.505
Quality Data and Reporting (Alpha = 0.752; KMO = 0.645; Eigenvalue = 2.304; % of Variance = 57.610)	
Quality data are always provided in a timely fashion.	0.468
* We rarely use quality data (cost of quality, defects, errors, scrap, etc.) as a tool to manage quality.	-
We use quality data to evaluate performance	0.498
Information on quality data is readily available to employees	0.903
Information on productivity is readily available to employees	0.725
Process Management (Alpha = 0.862; KMO = 0.824; Eigenvalue = 3.565; % of Variance = 59.418)	
We clearly define objectives of the processes necessary to achieve.	0.656
We establish responsibility for managing processes	0.685
We manage processes' interrelations as a system to achieve quality objectives	0.772
We analyze the effect of modifications to individual processes on the system as a whole.	0.775
We manage risks that can affect outputs of the processes	0.683
We have standardized process instructions which are given to personnel	0.724

Problem Solving (Alpha = 0.886; KMO = 0.736; Eigenvalue = 2.445; % of Variance = 81.516)	
Our company forms teams to solve problems	0.894
Problem solving teams have helped improve performance in our organization	0.875
In the past three years, many problems have been solved through small group sessions	0.783
Continuous Improvement (Alpha = 0.888; KMO = 0.848; Eigenvalue = 3.467; % of Variance = 69.332)	
Continuous quality improvement is an important goal of this organization	0.637
People in this organization are continually looking for better ways of doing their work	0.9
People in this organization are constantly improving their business process	0.87
All employees believe that it is their responsibility to improve quality	0.807
Continuous improvement of quality is stressed in all work processes throughout our organization.	0.701
Quality improvement is not a high priority for me.	
Reward (Alpha = 0.869; KMO = 0.713; Eigenvalue = 2.382; % of Variance = 79.384)	
Staff are rewarded for quality improvement	0.903
Managers are rewarded for making continuous improvements.	0.875
We pay a group incentive for quality improvement ideas	0.719
Economic Return (Alpha = 0.731; KMO = 0.673; Eigenvalue = 1.959; % of Variance = 65.293)	
Revenue	0.739
Profit	0.748
Return on investment	0.593
Cost Reduction (Alpha = 0.745; KMO = 0.722; Eigenvalue = 2.342; % of variance = 58.548)	
Cost of poor quality	0.429
Cost of energy consumption	0.701
Fees for waste treatment	0.877
General operations cost	0.669
Market Performance (Alpha = 0.613; KMO = 0.637; Eigenvalue = 1.699; % of variance = 56.625)	
Responsiveness to customers' requirements	0.506
Market share	0.605
Customer satisfaction	0.665
Emission Reduction (Alpha = 0.871; KMO = 0.820; Eigenvalue = 3.373; % of variance = 67.467)	
Frequency of environmental accidents	0.656
Air emissions	0.925
Waste water	0.87
Solid wastes	0.818
Consumption of hazardous materials	0.561
Resource Consumption Reduction (Alpha = 0.793; KMO = 0.700; Eigenvalue = 2.134; % of variance = 71.122)	
Raw material consumption	0.674
Energy consumption	0.811
Water consumption	0.776
Internal Social (Alpha = 0.642; KMO = 0.564; Eigenvalue = 1.773; % of variance = 44.318)	
Health insurance coverage	-
Attention to human resource development	0.583
Discrimination	-
Compliance with regulations	0.81
External Social (Alpha = 0.788; KMO = 0.703; Eigenvalue = 2.107; % of Variance = 70.230)	
Number of jobs provided	0.698
Involvement in local communities	0.779
Contributions to the local economy	0.756

Note: * Rejected items after the measurement test.

Appendix B. Timeline Effect on QM Practices Implementation Level

Dependent Variable	I	J	Mean Difference (I-J)	Std. Error	Sig.
Top management Support for QM	Group T1	Group T2	-0.062	0.128	0.878
		Group T3	-0.105	0.135	0.718
	Group T2	Group T3	-0.042	0.137	0.949
Training on Quality	Group T1	Group T2	-0.056	0.135	0.910
		Group T3	-0.018	0.142	0.991
	Group T2	Group T3	0.037	0.145	0.964
Product/Service Design	Group T1	Group T2	0.104	0.131	0.707
		Group T3	0.042	0.140	0.951
	Group T2	Group T3	-0.062	0.140	0.898
9	Group T1	Group T2	0.008	0.139	0.998
		Group T3	-0.150	0.146	0.560
	Group T2	Group T3	-0.159	0.149	0.536
Process Management	Group T1	Group T2	-0.030	0.136	0.973
		Group T3	-0.179	0.143	0.425
	Group T2	Group T3	-0.148	0.145	0.565
Continuous Improvement	Group T1	Group T2	0.106	0.158	0.779
		Group T3	-0.043	0.166	0.963
	Group T2	Group T3	-0.149	0.169	0.651
Problem Solving	Group T1	Group T2	0.061	0.161	0.923
		Group T3	-0.013	0.167	0.997
	Group T2	Group T3	-0.074	0.169	0.898
Rewards	Group T1	Group T2	0.057	0.172	0.942
		Group T3	-0.127	0.181	0.762
	Group T2	Group T3	-0.184	0.185	0.580

Appendix C. Industrial Effect on QM Practices Implementation Level

Dependent Variable	I	J	Mean Difference (I-J)	Std. Error	Sig.
Top Management Support for QM	Group I1	Group I2	0.068	0.128	0.952
		Group I3	-0.007	0.156	0.970
		Group I4	-0.033	0.130	0.805
	Group I2	Group I3	0.077	0.159	1.000
		Group I4	0.083	0.137	0.982
	Group I3	Group I4	0.053	0.165	0.978
Training on Quality	Group I1	Group I2	-0.057	0.140	0.994
		Group I3	0.192	0.171	0.989
		Group I4	-0.006	0.134	1.000
	Group I2	Group I3	0.017	0.165	0.963
		Group I4	-0.004	0.150	0.999
	Group I3	Group I4	0.112	0.184	0.988
Product/Service Design	Group I1	Group I2	-0.047	0.172	0.932
		Group I3	0.239	0.206	0.785
		Group I4	-0.090	0.169	0.823
	Group I2	Group I3	-0.035	0.205	0.989
		Group I4	0.068	0.128	0.606
	Group I3	Group I4	-0.007	0.156	0.450
Quality Data and Reporting	Group I1	Group I2	-0.033	0.130	0.978
		Group I3	0.077	0.159	0.801
		Group I4	0.083	0.137	0.939
	Group I2	Group I3	0.053	0.165	0.677
		Group I4	-0.057	0.140	0.998
	Group I3	Group I4	0.192	0.171	0.616
Process Management	Group I1	Group I2	-0.006	0.134	1.000
		Group I3	0.017	0.165	1.000
		Group I4	-0.004	0.150	1.000
	Group I2	Group I3	0.112	0.184	1.000
		Group I4	-0.047	0.172	1.000
	Group I3	Group I4	0.239	0.206	0.999
Continuous Improvement	Group I1	Group I2	-0.090	0.169	1.000
		Group I3	-0.035	0.205	0.906
		Group I4	0.068	0.128	0.887
	Group I2	Group I3	-0.007	0.156	0.929
		Group I4	-0.033	0.130	0.912
	Group I3	Group I4	0.077	0.159	1.000
Problem Solving	Group I1	Group I2	0.083	0.137	0.993
		Group I3	0.053	0.165	0.694
		Group I4	-0.057	0.140	0.842
	Group I2	Group I3	0.192	0.171	0.650
		Group I4	-0.006	0.134	0.785
	Group I3	Group I4	0.017	0.165	0.999
Rewards	Group I1	Group I2	-0.004	0.150	0.950
		Group I3	0.112	0.184	0.894
		Group I4	-0.047	0.172	0.995
	Group I2	Group I3	0.239	0.206	0.998
		Group I4	-0.090	0.169	0.922
	Group I3	Group I4	-0.035	0.205	0.869

Appendix D. Size Effect on QM Practices Implementation Level

Dependent Variable	I	J	Mean Difference (I–J)	Std. Error	Sig.
Top management Support for QM	Small	Medium	−0.113	0.111	0.567
		Large	−0.217	0.120	0.173
	Medium	Large	−0.104	0.125	0.683
Training on Quality	Small	Medium	0.038	0.112	0.938
		Large	−0.224	0.122	0.160
	Medium	Large	−0.262	0.126	0.097
Product/Service Design	Small	Medium	−0.057	0.121	0.884
		Large	−0.184	0.131	0.340
	Medium	Large	−0.127	0.136	0.623
Quality Data and Reporting	Small	Medium	0.082	0.120	0.774
		Large	−0.283	0.130	0.077
	Medium	Large	−0.365 **	0.134	0.020
Process Management	Small	Medium	0.030	0.114	0.963
		Large	−0.318 **	0.123	0.029
	Medium	Large	−0.348 **	0.128	0.020
Continuous Improvement	Small	Medium	−0.040	0.125	0.947
		Large	−0.471 **	0.136	0.002
	Medium	Large	−0.432 ***	0.141	0.007
Problem Solving	Small	Medium	0.108	0.148	0.746
		Large	−0.223	0.159	0.343
	Medium	Large	−0.330	0.158	0.094
Rewards	Small	Medium	−0.267	0.144	0.157
		Large	−0.392 **	0.155	0.034
	Medium	Large	−0.124	0.160	0.717

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