The Seybold Report

ISSN 1533-9211

DOI 10.17605/OSF.IO/2XAJD

EMPIRICAL STUDY OF THE IMPACT OF THE MATURITY LEVEL OF THE QUALITY MANAGEMENT SYSTEM ON INDUSTRIAL PERFORMANCE IN MOROCCAN COMPANIES

KHADIJA KACEMI[1], MARIAM BENHADOU[2], ABDELLAH HADDOUT[3] and BASMA BENHADOU[4]

[1,2,3]Industrial Management and Plastics Forming Technology Team, Mechanics, Engineering and Innovation Laboratory, LM2I, National High School of Electricity and Mechanics -ENSEM-, Hassan II University Casablanca- Morocco.
[4]International University of Casablanca, Morocco.
Email: [2]mariambenhadou@yahoo.fr

Abstract

The pressure related to the market's globalization on the one hand and faced on the growing of customer's specific needs of on the other hand, industrial companies are in perpetual quest for productivity research. They are constantly confronted with the challenges of reduce production costs, reduce lead times for finished products to customers and improve the quality of their products. This forces them to improve their value chains and their flexibility to meet the changing needs of customers. Companies must implement a process of continuous improvement of their competitiveness based on several strategic axes such as production costs, product quality and innovation in order to meet the individual requirements of customers. We study, in this paper, the impact of the quality management system and operational excellence tools on industrial performance. A statistical study of the results obtained from the answers to the questions of the survey carried out with the SPSS software. This analysis has thus made it possible to develop a specific model of the impact of the quality management system on performance in Moroccan companies.

Keywords: Quality management system, industrial performance, causal model, TQM

1. INTRODUCTION

The quality management system has become a priority for companies. It is an element likely to maintain and develop the performance of companies to global competition. Several researchers have confirmed a positive link between the maturity of the management system and business performance. All the authors have all agreed on the fact that the more the company is oriented towards the quality approach and implements the practices of the quality management system, the more its overall performance increases.

In our study, a review of the literature was conducted ([1], [2], [3], [4], [5], ...) to develop the most recent models of the quality impact on firm performance and a comparative study was performed to conclude the results of quality practices that lead to the performance of the company. A comparative study of the different models of the impact of the quality management system on business performance has been carried out. This study has allowed to establish the key criteria of the QMS as well as the performance criteria, which will be the subject of a survey later.

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/2XAJD

A field survey was established and distributed nationwide. This survey was carried out on 500 Moroccan companies and will allow collecting information on the different companies in the scope of study as well as the answers of the heads and managers who gave their opinions on the relationship between quality management and business performance.

A statistical study of the results obtained from the answers to the questions of the survey is made via the SPSS software and which must eliminate or keep the assumptions made on the relationship between quality management and business performance. This analysis has permitted to develop a model of the impact of the quality management system on industrial performance in Moroccan companies.

2. CONCEPTUAL FRAMEWORK

Through a review of the literature, we found that several researchers have addressed the topic of the impact of quality management on firm performance.

Somme researchers have confirmed a positive relationship between quality and performance ([1], [2], [3], [4], [5],..... [22]), while other researchers have emphasized a negative relationship between quality management and firm performance ([23], [24], [25], [26],..... [31]).

According to our study, we have identified through the literature review the key of practices that impact the quality management and the key criteria that are impacted.

2.1 Quality practices

The quality management practices that emerged from the consultation of articles by different authors ([5], [6], [7],....) are as follows:

- Top Management
- Process management
- Customer focus
- Training and skills
- Supplier Management
- Strategic planning
- Continuous improvement
- Employee participation
- Partnership and resources

2.2 Performance criteria

The performance criteria impacted by quality management are as follows:

- Financial Performance
- Operational performance

ISSN 1533-9211

DOI 10.17605/OSF.IO/2XAJD

- Customer focus

3. STUDY MODEL

The following model describes the relationship between quality practices and performance in Moroccan companies from all sectors:

Top Management

Several studies have demonstrated the important role of top management as a key quality practice ([32], [38], [39],).

We can therefore pose the following hypothesis:

H1: Top Management is positively linked to performance in Moroccan companies

Process management

Process management: according to the researchers ([32], [33], [11], [36], [37], [38], [39])) process management has a positive impact on the performance of the company. We can establish the following hypothesis:

H2: Process Management positively influences performance in Moroccan companies

Customer focus

Customer focus: through a literature review, several researchers including ([11], [33], [40], [38], [39]) confirmed the positive link between customer focus and the performance of the company.

We will therefore test the hypothesis:

H3: The implementation of the customer focus practice improves the performance of the company

Training and skills

Training and skills: Training and skills play a key role in ensuring that the company improves in performance according to the authors ([38], [39], [40]), which leads us to make this hypothesis:

H4: Training and skills positively influence performance in Moroccan companies

Supplier management

Supplier management: this quality practice is considered to be a key practice which leads to the performance of the company ([11], [32], [39], [40],) hence the following hypothesis:

H5: Supplier management is positively linked to performance in Moroccan companies.

ISSN 1533-9211

DOI 10.17605/OSF.IO/2XAJD

Strategic planning

Strategic planning: according to the authors [32], [33], [36], [37], [40], [39], there is a positive link between strategic planning and the performance of the company. This allows us to propose the hypothesis below:

H6: Implementing strategic planning improves firm performance.

Continuous improvement

Continuous improvement is a key practice that positively impacts the performance of the company, explains [11] this hypothesis will be tested:

H7: Continuous improvement contributes to firm performance.

Employee participation:

Employee participation: The fact of involving the employees of the company makes them more profitable and motivated which allows the increase in their performance and subsequently the increase in the performance of the company [32], [11], [39], this will be tested using the following hypothesis:

H8: Employee participation improves company performance.

Partnership and resources

Partnership and resources: this practice of quality management is positively linked to the performance of the company, [34], [36]. This hypothesis will be tested:

H9: Partnership and resources positively influence performance in Moroccan companies;

The model to test in the field is as follows:

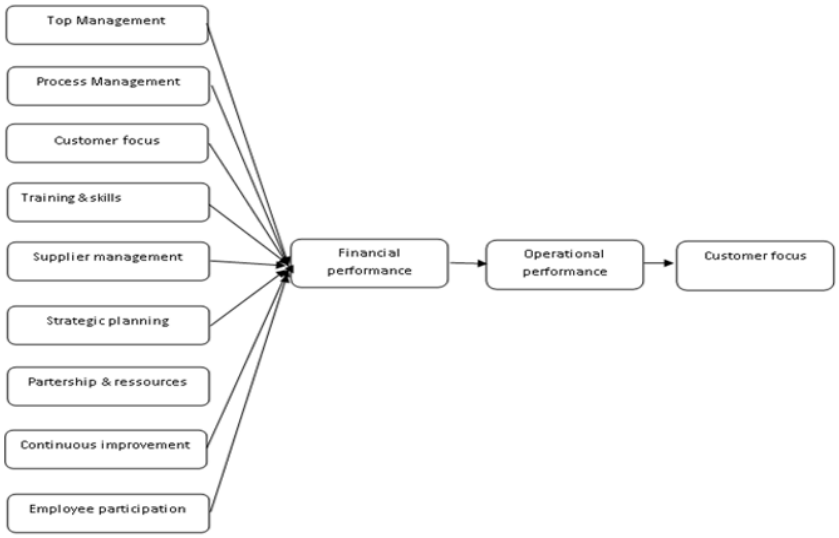

Fig. 1: The model to test in the field

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/2XAJD

4. METHODOLOGY

The methodology adopted by this study consists to test the hypotheses using a survey administered at the level of Moroccan national companies.

The survey was distributed to companies to obtain their opinion about the impact of quality management on firm performance.

The survey questions were collected from the literature review.

Companies were asked about their opinions on quality practices by answering questions on a 5-level scale (1 Very low, 2 low, 3 medium, 4 high, 5 very high).

Regarding the performance axis, 3 criteria were adopted: financial performance, operational performance and customer axis.

The survey contained questions about the profile of the companies interviewed: sector of activity, legal form, staffing, etc.

The responses obtained will be analysed and interpreted using SPSS software.

5. SCOPE OF THE STUDY

The scope of our study represents Moroccan companies from all sectors.

The survey was distributed using email and face to face.

The survey consists of 3 parts: the first part concerns questions on the company profile, the legal form, date of creation, ...The second part of the survey concerns the questions on quality practices with 44 questions.

The third part of the survey concerns the performance criteria with 12 questions.

6. ANALYSIS, DATA PROCESSING AND RESULTS

The profile of responding companies is as follows:

The area of the activity:

- 3.9% of responding companies represent the IT sector
- 96.1% of responding companies represent the industrial sector

The legal form of the companies is as follows:

- 50.7% of companies are SARL
- 28.9% of companies are SA
- 20.4% of companies represent other forms

ISSN 1533-9211

DOI 10.17605/OSF.IO/2XAJD

Staff

The size of the companies that responded to the survey is as follows:

1-50 represent 53.3%

50-100 represent 11.8%

100-200 represent 5.9%

> 200 represent 28.9%

ISO 9001 certification

* 52% of companies participating in the survey are ISO 9001 certified

* 48.7% of companies participating in the survey are not ISO 9001 certified.

Data processing was carried out using SPSS software in three stages:

1. Analysis of internal consistency
2. Principal component analysis (PCA)
3. Correlation analysis

6.1. Analysis of internal consistency

The analysis consists of measuring the internal consistency of the survey by measuring the cronbach's alpha coefficient.

The Cronbach's alpha coefficient is defined as follows:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k}\sigma_{Yi}^{2}}{\sigma_{X}^{2}}\right) \qquad (1)$$

Where k is the number of items, where Ϭ²x is the variance of the total score and Ϭ²yi is the variance of item i.

An alternative and equivalent formula in the case of equal variances of the items is:

$$\alpha = \frac{k\bar{r}}{1+(k-1)\bar{r}} \qquad (2)$$

$\bar{r}$ is the average correlation between items. We then speak of a standardized score instead of a raw score or the Spearman-Brown formula. The formula indicates that, as long as the average correlation does not change, the reliability of a scale increases because of its number of items.

If cronbach's alpha> 0.7 this indicates that the items in the study measure the same skill or characteristic and that the error is small.

If cronbach's alpha <0.7 the items may not measure the same skill or characteristic consistently.

In our study the result of the crombach alpha index is as follows:

ISSN 1533-9211

DOI 10.17605/OSF.IO/2XAJD

Table 1. Crombach alpha index

Reliability statistics		
Alpha de Cronbach	**Cronbach's Alpha based on standardized elements**	**Number of elements**
,975	,975	56

Cronbach's alpha value 0.975 is correct > 0.7 which indicates that the questionnaire data is reliable.

By measuring the cronbach's alpha index for each Item we get the table below.

Table 2: Crombach alpha index for each Item

Variables	Alpha de crombach	Number of items
Top management	0.897	6
Process management	0.905	5
Customer focus	0.883	4
Training and skills	0.876	5
Suppliers Management	0.908	8
Strategic planning	0.923	4
Partnership and resources	0.860	4
Continuous improvement	0.896	4
Employee participation	0.911	4
Financial performance	0.879	5
Operational performance	0.876	3
Customer focus	0.611	4

From the results, we can say that all of the crombach alpha indices are greater than 0.7 except for the customer focus whose crombach alpha is 0.6 <0.7 to reject.

Our model then becomes:

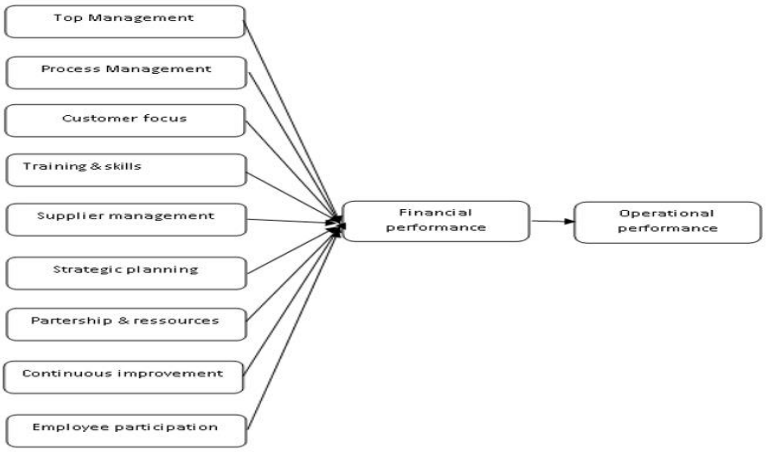

Fig. 2: The revised model

ISSN 1533-9211

DOI 10.17605/OSF.IO/2XAJD

6.2. Principal component analysis (PCA)

PCA is a factor analysis that synthesizes information into just a few new variables called principal components. The number of main components is less than or equal to the number of original variables.

In our study, the dimensions of the variables for each quality practice have been reduced in order to simplify the correlation analysis in the following section.

For the PCA to be feasible, the following conditions must be met:

- Correlation coefficients> 0.5
- Sphericity of Bartlett with a meaning that tends towards 0
- KMO index> 0.5

These all conditions were met for the various variables of the quality and performance of our study which gave us using SPSS that many correlation coefficients (r) were quite strong (greater than 0.5).

Example of Bartlett's KMO and Sphericity results:

Table 3: KMO index and Bartlett test

KMO index and Bartlett test		
Kaiser-Meyer-Olkin index for measuring the quality of sampling.		,861
Bartlett's sphericity test	Khi-carré approx.	292,596
	ddl	10
	Signification	,000

KMO = 0.861 which is greater than 0.5

Meaning of Bartlett's Sphericity test = 0.000 which is good.

A PCA analysis was performed to extract the most representative variables from each quality practice or performance criteria.

6.3. Correlation analysis

The second step is to measure the correlation of the independent variables (quality practices) with the dependent variables (performance criteria). This consists in measuring the degree of linear connection between the dependent X and independent Y variables of our sample.

In our correlation analysis, there are two important results:

1. The result of the correlation test or Pearson Correlation (r).
2. The value of p of the slope test or Sig. (bilateral).

Pearson correlation (r).

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/2XAJD

The value r = 0 signifies an absence of link, and a value of 1 constitutes a perfect link between two variables.

A positive value of the r coefficient means that the relationship between X and Y is proportional; when X increases (or decreases), Y increases (or decreases).

A negative value of the r coefficient means that the relationship between X and Y is inversely proportional; when X increases (or decreases), Y decreases (or increases).

So we can say that the relation between X and Y is:

- perfect if r = 1
- Very strong if r> 0.8.
- Strong if r is between 0.5 and 0.8.
- Of average intensity if r is between 0.2 and 0.5.
- Low if r is between 0 and 0.2.
- None if r = 0

The value of p:

The slope significance test makes it possible to decide the link between the two variables is significant, in other words if the observed correlation between X and Y (sample) exist within the study population.

The significance threshold is 0.05.

- If the value of Sig. or p-value is greater than 0.05, the observed correlation between X and Y is due to chance.
- If Sig. or p-value is less than 0.05, a correlation between X and Y does exist within the population.

Following the correlation analysis between quality practices and performance in national companies, we have the following results with SPSS.

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/2XAJD

Table 4: Correlation between quality practices and firm performance

Variables	Hypotheses	R (Pearson correlation coeff)	P value	Decision
Top Management /performance	H1	0,428 (financial Perf) 0.580 (operational Perf)	0.000 0.000	Accepted
Process Management /performance	H2	0.444 (financial Perf) 0.453 (operational Perf)	0.000 0.000	Accepted
Customer focus /performance	H3	0.299 (financial Perf) 0.576 (operational Perf)	0.03 0.000	Accepted
Training & skills/performance	H4	0.180 (financial Perf) 0.410 (operational Perf)	0.081 0.000	Accepted
Supplier management /performance	H5	0.272 (financial Perf) 0.374 (operational Perf)	0.008 0.000	Accepted
Strategic planning /performance	H6	0.321 (financial Perf) 0.477 (operational Perf)	0.002 0.000	Accepted
Partership & ressources /performance	H7	0.342 (financial Perf) 0.449 (operational Perf)	0.001 0.000	Accepted
Continuous improvement /performance	H8	0.300 (financial Perf) 0.453 (operational Perf)	0.003 0.000	Accepted
Employee participation /performance	H9	0.164 (financial Perf) 0.411 (operational Perf)	0.112 0.000	Accepted

According to these results, all the hypotheses are accepted; there is a positive relationship between quality practices and company performance.

6.4. Interpretation of results and discussion

By comparing these results with the thresholds of the correlation coefficients and the p-value, we can confirm that all the Hypotheses have been retained and that quality practices positively impact firm performance.

The link of each quality practice with performance is described as follows:

There is a strong positive link between top management and performance, in particular operational performance ($r = 0.580$, $p = 0.000$) and this is the most important practice according to the study, therefore H1 hypothesis confirmed.

The second quality practice with a strong correlation with performance, in particular operational performance, is customer focus ($r = 0.576$, $p = 0.000$), hypothesis H3 confirmed.

According to the results, the practice of process management comes third with a positive and average correlation with performance ($r = 0.453$, $p = 0.000$).

There is a positive and average relationship between practices (partnership and resources) (Continuous improvement) (strategic planning) (supplier management) and firm performance (H7, H8, H6, H5 confirmed).

ISSN 1533-9211

DOI 10.17605/OSF.IO/2XAJD

The relationship between the Training and skills practice and financial performance is positive and weak (r = 0.180, p = 0.081).

7. CONCLUSION

To face competition and meet customer needs, companies have to master their strategies and have management systems to improve their quality, costs and global performance. As a result, several companies have adopted the quality approach.

Total quality management has always been considered as a performance lever. It is in this perspective that we have developed this empirical study on the impact of the quality management system on industrial performance in Moroccan companies.

We have carried out a comparative study of the different models of the impact of the quality management system on business performance, making it possible to identify the key practices of the quality management system (QMS) and the key practices of industrial performance in particular: financial performance - operational performance and customer satisfaction.

In addition, we conducted a field survey based on a survey and a statistical analysis with SPSS software of the results obtained.

Finally, we have developed a model of the impact of the quality management system on industrial performance in Moroccan companies.

References

1. T. Hansen, Quality in the market place: a theoretical and empirical investigation. European Management Journal, 19(2), pp. 203-211, 2001.
2. J. Hansson, H. Eriksson, The impact of TQM on financial performance. Measuring Business Excellence, 7(1), pp. 36-50, 2003.
3. Nair, Meta-analysis of the relationship between quality management practices and firm performance, Journal of Operations Management 24 pp 948–975, 2006
4. H. Kaynak, The relationship between total quality management practices and their effects on firm performance. Journal of Operations Management, 21, pp.405 435, 2003.
5. T.J Douglas, w. Q. Judge, Total quality management implementation and competitive advantage: the role of structural control and exploration. Academy of Management Journal, 44, pp. 158-169, 2001.
6. D. Samson, M. Terziovski, The relationship between total quality management practices and operational performance. Journal of Operations Management, 17, pp.393–409, 1999.
7. F. Talib, Z. Rahman, M.N. Qureshi, The relationship between total quality management and quality performance in the service industry: a theoretical model International Journal of Business, Management and Social Sciences Vol. 1, No. 1, 2010, pp. 113-128
8. ChiPhan, A. Bahjat, Y. Matsui, Quality management practices and competitive performance: Empirical evidence from Japanese manufacturing companies, Int. J. Production Economics 133 (2011) pp 518–529,
9. D.-Y. Kima, b Vinod Kumar, U. Kumarb, Relationship between quality management practices and innovation, Journal of Operations Management 30, pp 295–315, 2012
10. E. Zehir, E Sadikoglu, Relationships among Total Quality Management Practices: An Empirical Study in

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/2XAJD

Turkish Industry, International Journal of Performability Engineering Vol. 8, No. 6, pp. 667-678, 2012.

11. Calvo-Mora, A. Pico´n, C. Ruiz and L. Cauzo, The relationships between soft-hard TQM factors and key business results, International Journal of Operations & Production Management, Vol. 34 Iss 1 pp. 115 – 143, 2013
12. H. Kaynak, The relationship between total quality management practices and their effects on firm performance, Journal of Operations Management 21 (2003) pp 405–435
13. T Hansen, Quality in the market place: a theoretical and empirical investigation. European Management Journal, 19(2), pp. 203-211, 2001.
14. J. Hansson, H. Eriksson, The impact of TQM on financial performance. Measuring Business Excellence, 7(1), pp. 36-50, 2015.
15. Nair, Meta-analysis of the relationship between quality management practices and firm performance—implications for quality management theory development. Journal of Operations Management 24 (2006) 948–975
16. T.J. Douglas, W. Q., Judge Jr, Total quality management implementation and competitive advantage: the role of structural control and exploration. Academy of Management Journal, 44, pp. 158-169, 2011.
17. T. C. Powell, Total quality management as competitive advantage: a review and empirical study. Strategic Management Journal, 16, pp. 15-37, 1995.
18. R. McAdam, NG. Armstro, G.,B. Kelly, Investigation of the relationship between total quality and innovation: a research study involving small organizations. European Journal of Innovation Management 1 (3), pp. 133–147, 1998.
19. D.H. Gustafson, A.S. Hundt, Findings of innovation research applied to quality management principles for health care. Health Care Management Review 20 (2), 16–33, 1995.
20. J. R. Evans, W.M. Lindsay, The management and control of quality. Minneapolis: West Publishing, 1996.
21. D. Hemsworth et al., "Determining the Impact of Quality Management Practicesand Purchasing Related Information Systems on Purchasing Performance", the journal of entreprise information Management Vol 18, N°2, 2005.
22. Gustafsson et al., "The Role of Quality Practices in Service Organizations", international journal of service and industry Management Vol 14, N°2, 2003.
23. J. C. Anderson et al., "A Path Analytic Model of a Theory of Quality Management Underlying the Deming Management Method", Decision scienceVol 26, N°5, pp 53- 66, 1994.
24. N. Hardi, "The Effects of Quality on Business Performance", Quality Management journal, Vol 5, N°3, 1998.
25. L. Iaquinto, "Can Winners Be Losers? The Case of the Deming Prize for Quality and Performance AmongLarge Japanese Manufacturing Firms", Managerial auditing journal, vol 14, N° 12, pp 28-35, 1999.
26. O.Harari, Ten reasons why TQM doesn't work. Management Review, Vol.82, N°1,pp. 33–38, 1993.
27. M. Morgan, Creating Workforce Innovation—Turning Individual Creativity into Organizational Innovation. Business and Professional Publishing, Chatswood, NSW, 1993.
28. S. Jha, H. Noori, J.L Michela, The dynamics of continuous improvement— aligning organizational attributes and activities for quality and productivity. International Journal of Quality Science 1 (1), 19–47, 1996.
29. K.B. Hendricks, & V.R Singhal, Does implementing an effective TQM program actually improve operating performance? Empirical evidence from firms that have won quality awards. Management Science, Mars, pp. 415-436, 1997.

The Seybold Report
ISSN 1533-9211
DOI 10.17605/OSF.IO/2XAJD

30. H. Sun, Total quality management, ISO 9000 certification, and performance improvement. International Journal of Quality & Reliability Management, 17(2), 2000.
31. S. Manuela Macinati, The relationship between quality management systems and organizational performance in the Italian National Health Service (Italie), Health Policy 85 (2008) 228–241,
32. F. Appiah Fening, Relationship between quality management practices and the performance of small and medium size enterprises (SMEs) in Ghana, International Journal of Quality & Reliability Management Vol. 25 No. 7, 2008 pp. 694-708.
33. E. Sadikoglu, C. Zehir , Investigating the effects of innovation and employee performance on the relationship between total quality management practices and firm performance: An empirical study of Turkish firms, International Journal of Production Economics, Volume 127, Issue 1, September 2010, Pages 13-26
34. S. Parvadavardini , N. Vivek, S.R. Devadasan, Impact of quality management practices on quality performance and financial performance: evidence from Indian manufacturing companies, Total Quality Management & Business Excellence, 2015, DOI:10.1080/14783363.2015.1015411
35. E. Psomas Carmen Jaca, The impact of Total Quality Management on service company performance. Evidence from Spain. International Journal of Quality & Reliability Management, Vol. 33 Iss 3 pp. 380-398, 2016.
36. J. A. Nazari , TQM and organizational performance using the balanced scorecard approach Gholamhossein Mehralian School of Pharmacy, Shahid Beheshti University of Medical Sciences, Tehran, Iran, International Journal of Productivity and Performance Management, Vol. 66 Iss 1 pp. 111 – 125, 2017.
37. E. Sadikoglu and H. Olcay, The Effects of Total Quality Management Practices on Performance and the Reasons of and the Barriers to TQM Practices in Turkey, Hindawi Publishing Corporation Advances in Decision Sciences Volume 2014, Article ID 537605, 17 pages, 2014.
38. M. Parast a,n, S. G.Adams, Corporate social responsibility, benchmarking, and organizational Performance in the petroleum industry : A quality management perspective, Int. J. Production Economics 139 (2012) 447–458.