Product quality and incitement to apply Six Sigma method in Certified Algerian companies: Lessons learned from practical experiences

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Abstract:
The business environment changes in Algeria push the companies to boost their quality products, optimize their production costs, and control totally their manufacturing processes through aspiring to adopt the Six Sigma method. Based on the Analytical Documentary Research and Literature Review which connected Empirical Cases, this article deals with the Algerian companies that are aspiring towards achieving the best product quality and performance; this orientation necessitates Algerian companies to benefit from the successful experiences of some countries, as we have mentioned. We suggest exploiting and integrating ISO assets as an efficient program of TQM; to make available material and immaterial requirements to adopt Six Sigma successfully; enabling human factors to this new approach.
Keywords: Product Quality; Certified companies; Method; Algerian Companies; Six sigma.
Jel Classification Codes : M11 ; M13 ; L15.

1. INTRODUCTION

By implementing a quality policy and determining orientations and objectives, the company's management team is committed to the product quality approach. This frequently entails company restructuring, which primarily affects the organization by establishing a quality structure, a quality action plan, stating the goals to be reached and the methods to be

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employed, and employee involvement. Everyone is a good performer and collaborator for achieving goals.

To establish product quality within the organization, traditional management functions (planning, organizing, directing, and controlling) must be adapted to ensure the tools for improving company performance and the new philosophy represented by quality management.

Customer orientation, which conducts to meet customer needs and continual improvement, is one of the outstanding quality principles, this approach necessitates identifying the company processes related to achievement, management, support, and interactions which entails bringing the various techniques under control, analyzing their performance, making improvements, and putting them in place for helping the company to achieve its goals.

The Six Sigma approach strives to reduce process variability to make them more dependable, stable, and predictable, while also ensuring "perfect" process reproducibility to perform zero faults and customer satisfaction.

While uncontrolled process dispersion leads to poor quality, which entails customer dissatisfaction and efficiency losses, yet the six-sigma method enables the business to develop solutions for variation control in order to prevent customer dissatisfaction.

1.1 The problematic of the study

In this context, we tackle the question below:

- Is it important and possible to use the six-sigma approach in Algerian businesses?

To cover this issue, we are discussing the following:

- Drawing Insight on Quality and functions involving in product quality
- Exploring compatibilities of ISO 9001and Six Sigma.
- Assessing Six Sigma method and its forecasted Impact on Algerian companies?

1.2 Study hypothesis:

Certified Algeria companies could try to adopt Six Sigma method by inspiring from successful experiences in the field.

1.3 Research Importance:

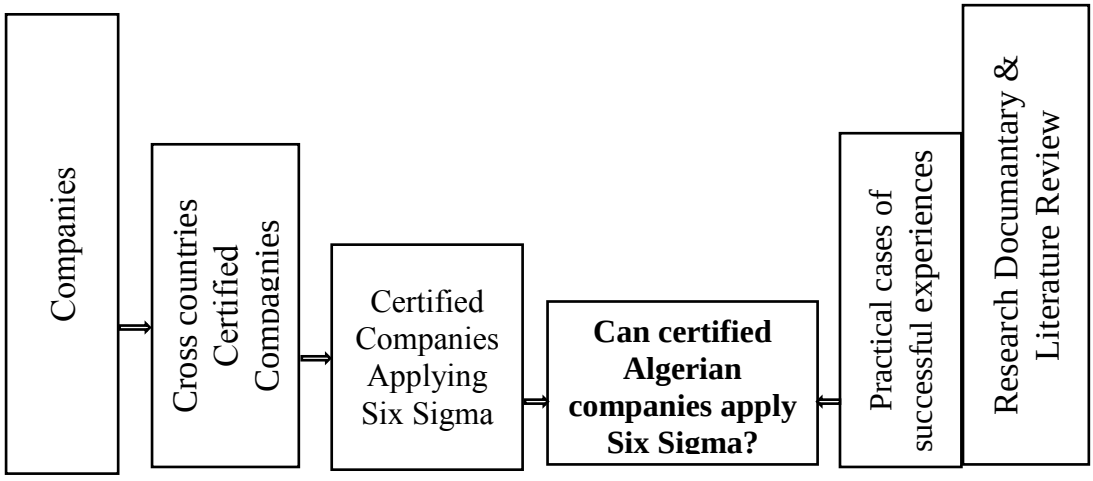
In the business world, company success depends on several factors, including product quality and the maintenance of the productivity parameters; this matter is linking to embrace the Six Sigma method, which could have achieved the following benefits and more:

- Lowering production costs, therefore lower product costs.
- Increasing productivity.
- Satisfaction of new customer requirements (Utility, Style, Packaging).
- keeping local market share.
- Increasing exports and conquering foreign markets.

1.4 Methodology:

To respond appropriately to the main question, we have used documentary research with pointing out the literature review connected to empirical studies and analytical approach. this led us to discuss and develop the product quality, getting a deeper understanding on Six Sigma and debate by extension the application of the method in Algerian companies.

Fig.1. Design Methodology



Source: Elaborated by authors

2. Quality and function involved in producing quality

2.1 Quality

Quality is defined by the ISO 9000 version 2000 standard as a set of intrinsic characteristics that satisfy requirements. (Lukil Faten, 2002, p. 03) This definition is based on three dimensions (characteristics, satisfaction, and requirements): the product or service must satisfy the consumer's (user, customer) requirements (through features) at an acceptable price for the quality provided; additionally, the satisfaction must be superior to the competition to ensure customer loyalty.

Globally, the meaning of quality could be understood from the producer's perspective and the consumer's perspective. Quality management covers all the functions of the organisation to design and produce quality products and services, which fulfil the needs of the customers and generate ultimate satisfaction.

Such described by the American National Standards Institute (ANSI) as a collection of precise features and characteristics of service, Much is likely to meet certain needs.(FUMI, 2007, p. 109)

Philip Crosby defines quality as "compliance with some specifications established by management in response to customer requests".

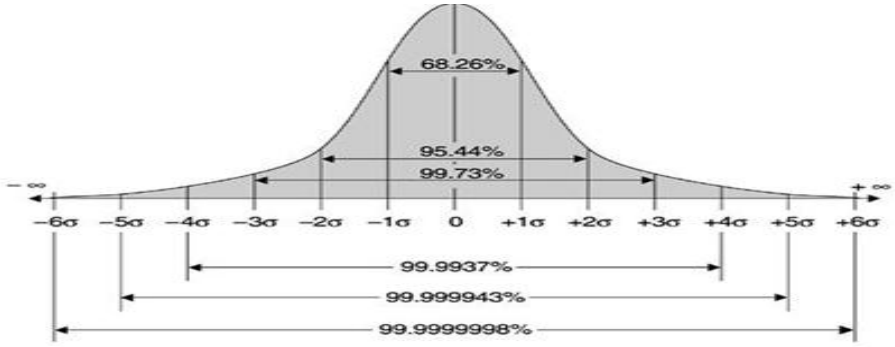
Globally, the notion of quality can be interpreted from both the producer's and the consumer's perspectives on a global scale. Quality management encompasses all aspects of an organization's design and production of high-quality goods and services that meet the consumers' expectations and fulfill their ultimate satisfaction.

2.2 Control of variability in the manufacturing process

The manufacturing line, equipment and tools used, raw materials and components, and the machine operator's experience and respect for working methods are all elements that influence product quality during production. Furthermore, any production process is subject to volatility; the amount of defects created by the line may differ from day to day. Other factors, such as raw materials, equipment, and others, could account for these discrepancies. Values on each side of a centerline emerge from a manufacturing process with only unintentional causes of variance. As a

result, if the manufacturing operation output does not change randomly, this process is regarded to be in statistical control. There would also be changes coming from specific causes in this situation, which could take the form of a trend, with results fluctuating consistently upwards or downwards. This change could occur as a result of a new raw material supply (supply function) or a change in machine adjustment (Maintenance function). For a process that should follow a normal law, the observation number grows forever, and the measuring instrument's accuracy grows indefinitely. The frequency polygon tends to become a continuous curve, with a mean that measures central tendency and a standard deviation that measures dispersion. These theoretical values can be used in a theoretical distribution. The mean or standard deviation of the experimental distribution must be computed from the observations, with the estimated mean designated by X and the standard deviation calculated by. The normal probability distribution is symmetrical to the mean, with 68.3 percent of the population falling between - and +, 95.5 percent falling between -2 and +2, and 99.7 percent falling between -3 and +3. (see figure 02). Each segment is referred to as a standard deviation, or standard deviation from the mean, in technical terms. The standard deviation is defined by the Greek letter Sigma written in lower case. Simply said, Six Sigma is a technical idea that assesses current performance and determines how many Sigma can be subtracted from the average before customers become dissatisfied. If we consider customer unhappiness to be a defect, Six Sigma implies that there will be just 3.4 defects per million opportunities, which is the closest to perfection (George, 2006).

Fig.2. Normal distribution of probability and Six Sigma



Sources:(Hessing, 2015)https://sixsigmastudyguide.com/project-baseline-sigma/

The technique principle is to ensure that all elements resulting from the study process are within a factor of 6 of the overall average of the features resulting from the process. (Justine,2014) The chance of the product being rejected by the client for not fulfilling certain expectations will be greatly reduced by lowering the variability of the product in the process.

As a result, Customer satisfaction brings an increase in profitability to the company with the following cumulative effects:

- Reduction of scrap, alterations, and globally non-quality costs;
- Improvement of machine availability and return rate;
- Achievement of a significant market share.

2.3Process of product quality in companies

Algerian companies seek to sell their products locally or export to other countries as part of the government's new policy to deal with falling in foreign exchange resources caused by lower oil prices. Therefore, the Algerian company must identify the customers' needs and requirements and then produce products to sell according to these needs and requirements. Also, they ought to take into account the applicable regulations for the proposed product, as well as the competitive products

Obtaining a compliant product depends on the effort of several roles within the company that influence the compliance of this product; we will focus on some functions without neglecting others, such as logistics function, management, and others.

2.3. a. Market research

As known, the customer who decides what to buy; therefore, the manufacturer must understand the customer's needs and requirements through market research, which also provides information on competitive products. In addition, the manufacturer should comprehend what regulations the product is subject to for taking them into account.

Product development: while preparing design products, the company considers the market research and the available materials and tools of production. This design will lead to the new product specifications.

2.3. b.Supply

This function is no longer the purchasing department, which receives from the user services purchase requests specified in quantity and quality and transforms them into clear orders in attention to satisfy needs at the lowest price without any authority of validation or questioning. This function also integrates a notion of continuity, a search for optimisation in purchasing on the short and medium-term located upstream of the production process and constituting an essential element for the quality and cost of the products manufactured by the company (H.Fayol: "buying well is as important as producing well").

2.3. c.Production

The first phase in the manufacturing process is the preparation through the development of the manufacturing process, the acquisition of necessary machines and tools, the preparation of the manufacturing process specifications, selection and training of personnel. This process would meet the specifications established during the design product and development to avoid increasing production costs by adding sorting, re-machining or scrap costs. An inspection schedule must also be prepared. This work involves developing inspection guides and providing inspection tools to assess the probability of eliminating manufacturing defects.

2.3. d. Marketing

Selling the product in the market for which isn't intended may create anunsatisfied customer base. It should be limited to the need to which the product was designed. Potential buyers must be informed about the

product's characteristics and fields without exaggerating regarding the ability of this product to meet their expectations.

After-sales service: the after-sales service must help the customer to ensure maintenance for correct operation by providing users handbook, spare parts and repair workshops for quick and practical assistance.

2.3. e. Human resources

This function aims to provide the human resources necessary to meet the quality objectives and results desired by the company. The customer remains the central core of all company functions (see figure N°03),

Fig.3. The core functions (client)

Source: By authors, using the functions mentioned above.

Before beginning the manufacturing process, it is necessary to plan the business activities that have a direct effect on the product quality as shown in the following table:

Table 1. Business Planning Influences Product Quality

Function	Activity	Result
Market research Product Development	To analyse customer needs. Design assessment to meet quality requirements and manufacturing capability.	Satisfactory product. Suitable design for manufacture.
Supply	To acquire materials, machinery and tools. Discuss quality requirements with suppliers.	Quality material, machinery and suitable tools. Adequate delivery at all times.
Production	Choose the process and	Process with required capacity,

	production operations. Develop production documentation.	profitable production (cost/ quality) establishment the list of tasks and manufacturing instructions
After sales service	Identification of critical features for the customer.	Rapidity of after-sales service
Marketing	To discuss expectations and specifications with customers.	Products comply with requirements
Human resources	Defining recruitment and training needs for staff	Qualified staff (in management, mastery and execution).

Source: by authors from functions involved in producing Product Quality.

3. Companies transformation: ISO as preliminary step to Six Sigma

For the Algerian ISO certified companies, although the evolution of the different versions of certification notably the latest ISO 9000/2015 (Nine companies are certified since 2015, and 57 before that, Appendix.1), they do not propose or impose a concrete approach to create dynamic process progress. even though the 2015 version is strongly oriented towards customer satisfaction through a process organisation, On the other side, Six Sigma provides the instruments to create this dynamic by using statistical tools.

world-class business, as the models enable a firm to meet global standards. In these circumstances, implementing Six Sigma through an ISO 9001-based Quality Management System is more favorable for Algerian businesses. Many researchers and practitioners have attempted to combine Six Sigma and the ISO 9001 standard.

The table below we collect some successful models as proofs where carrying out real case studies related to companies belonging at different sectors who have performed the application of six sigma through ISO practices basis, this empirical Cases report withdrawn from literature review encourage Algerian companies to do similarly In order to sustain Six Sigma initiatives.

Table 2. Practical cases

Authors	Article title&years	Methodology &Country	Objectives &findings
S. Karthia*, S.R. Devadasana , K. Selvarajub, N.M. Sivaramaan d C.G. Sreenivasa	Implementa tion of Lean Six Sigma through ISO 9001:2008 based QMS: a case study in a textile mill-2013	Case study The case study was conducted in one of the spinning units of a leading textile company having four spinning units and various other manufacturing and having ISO before south India	Paper demonstrates the implementation of the hypothetical steps to adopt L6QMS-2008 model in a spinning mill. Six Sigma concepts were never tried in the textile unit,
Sachidanan d S. More Maruti S. Pawar BMIT, Solapur,	Implementa tion of Six Sigma with ISO in the Indian Textile Industry for Improveme nt in Performanc e-2015	questionnaire was sent to the sample companies . In this study data is collected from 210 textile companies which are member of Textile Association India (TAI),	This paper discusses the implementation of quality management systems (Six Sigma) along with ISO in the textile industry of India
Pedro A. Marques1, José G. Requeijo	SIPOC: A Six Sigma Tool Helping on ISO 9000 Quality Managemen t Systems	Case study in graphics company that produces packages in compact cardboard,	This paper discusses how SIPOC diagrams across the DMAIC can bridge the integration between an ISO 9001 quality management system and Six Sigma
Pedro Marques ; Jose´ Requeijo ; Pedro Saraiva ; Francisco	Integrating Six Sigma with ISO 9001- 2013	theoreticalframework	this paper proposes a set of guidelines to combine and integrate both approaches a useful theoretical framework to develop, implement, maintain,

Fraza˜o-Guerreiro			and improve a QMS (ISO) in parallel with a Six Sigma program.
Leen G Mkhaimer1, Mazen Arafeh2, and Ahmad H Sakhrieh	Effective implementation of ISO 50001 energy management system: Applying Lean Six Sigma approach-2017	case study at A prominent pharmaceutical company in Jordan using DMAIC approach to support the framework of ISO	This paper proposed model combine the LSS and ISO 50001 system approaches and has provided beneficial outcomes
EvangelosPsomas	The underlying factorial structure and significance of the Six Sigma difficulties and critical success factors The Greek case -2016	A research study was carried out in 91 companies ISO 9001 certified Greek manufacturing companies through a structured questionnaire to manufacturing companies from different business sectors	The article contributes to the literature by determining the underlying structure and the significance of the Six Sigma difficulties and CSFs. This is the first research study in the field of Six Sigma that has been carried out in ISO 9001 certified manufacturing companies
Mehmet TolgaTaner	A Feasibility Study for Six Sigma Implementation in Turkish Textile SMEs-2012	The questionnaire was emailed to 100 randomly selected Turkish SMEs operating in the textile industry. Twenty-eightSMEsamong 5 adopt iso 9000, returned the questionnaire.	This paper aims to investigate the Critical Success Factors (CSFs) for the successful introduction of Six Sigma in Small and Medium Sized Turkish Textile Enterprises

Abdallah Ali Abdallah	Effective implementation of Japanese quality methods during health pandemics, 2021	Survey based approach used, 500 manufacturing companies were selected and surveyed. The selected companies are known to use at least one quality method such as lean management, ISO 9001, European foundation for quality management (EFQM) and Six Sigma	After receiving all answered surveys, more than 400 out of 500 surveyed companies were ISO 9001 certified, but those who said their companies actually implements ISO 9001 were only 191 and 79 companies use Six Sigma.
Paulo Augusto Cauchick Miguel MarlyMonteiro de Carvalho	Benchmarking Six Sigma implementation in services companies operating in an emerging economy-2014	Empirical cases -based research is employed as methodological approach. Data were mostly gathered through semi-structured interviews with managers involved with Six Sigma implementation. From servise sector: healthcare, telecommunication and insurance companies	The research shows the importance of Six Sigma implementation in service companies in addition to its contribution to practical application by identifying the relevant aspects of its introduction

Source: Elaborated by researchers with relying on different studies

Based on aforementioned cases, The effective implementation of ISO 9001 certification should consider as the mid-way towards the implementation of advanced systems and models of TQM especially Six Sigma.

The table reports very successful application that demonstrates the advantages, which Algerian companies can learn in terms of adopting structured methodologies to improve the quality of their products and to get the efficiency of their processes

4. Six Sigma method

4.1 Six Sigma definition

Six Sigma is a systematic approach for strategic process improvement that heavily depends on statistical techniques and the

scientific method in order to lower customer-defined fault rates. (Brady, E., and Theodore, T. 2006, p. 336).

"Six Sigma is a program combining the most effective statistical and non-statistical methods to do overall business" (Pearson, 2001, p. 37)

Also known as quality improvement that is mostly based on facts and data and prioritizes defect prevention on detection, by eliminating variation and waste, this technique improves customer satisfaction and operational performance, resulting from competitive advantage (Volck, 2009).

Six Sigma is a structured strategy for improving operations with using technical and statistical tools. These tools referring to project management concepts and are designed to boost customer satisfaction and help the organization to meet goals.

The Six Sigma strategy is being built on a systematic approach based on both customer voice, a study of the customer's true demands, and measurable, reliabledata; one of the core ideas of Six Sigma is variability reduction (Nicolas et al., 2010).

This well-established methodology focuses on those process performance having critical characteristics to consumer satisfaction in order to uncover and eliminate defects, errors, or failures in business processes or systems.(Albliwi, Jiju, &Sarina, 2015).

Statisticians use it to decrease variance in any process, cut costs in manufacturing and services, save money on the bottom line, enhance customer happiness and reduce defects to 3.4 parts per million opportunities. (Albliwi, Jiju, &Sarina, 2015, p. 667).

"Six Sigma is a highly disciplined approach that helps us concentrate on developing and delivering near-perfect goods and services." Six Sigma's primary concept is to count how many flaws there are in a process. It permits us to find out how to get rid of them and dress as close to normal as possible (zero defects). GE's DNA has been transformed by Six Sigma–this attitude underpins everything we do and every product we make. 2020 (General Electric)

4.2Background

In 1980, Motorola CEO Robert Galvin recognized the value of

working consistently with variance reduction, as the Japanese had done for a long time, Collaborating with Bill Smith, Mikel Harryand Richard Schroeder, he made up an improvement program that was taken the name Six Sigma. Motorola was a hero of America's Malcolm Baldrige National Quality Award in 1988, owing to Six Sigma, which cut costs and variation in many operations. They announced a profit of 700 million dollars from the initiative in 1991 alone (DeLuzio, 2019).

"In my 40 years at GE, I have never seen anything like Six Sigma's intensity has brought to our organization," he said the Chief Executive Officer Welsh in the General Electric Annual Report of 2000. Many executives were intrigued in the massive savings announced by GE . As a result, in the late 1990s, there was an increasing interest on Six Sigma.

Six Sigma refers to a process' ability to deliver units within specified tolerances. The Greek letter'sigma,' which corresponds to the letter's,'For a stable process, this distance should be at least six times the standard deviation of the process output.

Nonetheless, the process mean allows to fluctuate in a minor but significant proportion over time.If the output is properly distributed, 3.4 defectives per million will occur on average, provided the process runs at most 1.5 off the goal value.

It is one of the most recent continuous improvement methodologies used by best-in-class businesses. It’s-Use is growing, and no longer limited for manufacturing, but covering Services, transactions, administration, research and development, sales, and marketing are just a few of the corporate fields where it's presently being used.

4.3Foundations of Six Sigma

The Foundations may be summarized as follows:

- Considering performance from the perspective of the customer;
- Understand the process;
- Make decisions based on measurements and analysis;
- Concentrating on the most important variables;
- Statistical analysis;
- Variation monitoring;
- Standardised approach

- Project selection based on financial impact;
- integrate Six Sigma into governance;
- charge the Implementation to senior management (Nicolas et al., 2010)

4.4 Six Sigma methodology

The Six Sigma methodology uses the improvement approach (DMAIC)(Shanmugaraja, Gunasekaran, & Nataraj, 2011) as indicated below

Fig. 4 Methods of Six Sigma

Source: (Krishnan &Prasath, 2013)

Define- Identify and characterize the low performing functional areas of the organisation.

A feasibility and cost study is conducted to determine the financial benefits and costs associated with the project. During the evaluation of the product quality, the client considers the specified qualities of the product to be lucrative (Brue, 2006).

Measure- As part of the process, data is collected to identify problems and their fundamental causes.

The statistical approach is used to assess the correctness of a process to establish the actual error rate involved in the process. The flaws are measured using flow charts, FMEA (failure mode effects analysis), effect diagrams, and other tools. Because this data is utilised to preserve records and enhance the process, it is important to record it here. (Deeb et al., 2018)

Analyse- There is a careful examination of data (and the team) to determine the process's problems. For example, where, how, and what is the defect's percentage? According to the law, all faults, whether human or machine-

related, are detected and corrected as necessary.

Innovate – As a result of this phase, several different remedies are explored to eradicate the problem. Scientific principles, management techniques, and technical concepts are employed.

Improve – As a result, the focus is on the design, which may be tweaked and adjusted to achieve a higher degree of performance. It is possible to utilise a variety of simulations and optimisation approaches. This means that although the main variables are fixed and kept within the validation limit, the improvement process is conducted within the parameters of the validation limit.

Control – As soon as the DMAIC process is initiated, the first three stages describe the process, while its last three steps optimise it, and it must be maintained frequently to achieve and maintain its advantages. At regular intervals, the process is checked to ensure that the critical variables are safe and secure. Finally, six Sigma leaders identify the project's purpose and assemble the tools necessary to tackle challenges in the forementioned phases.

4.5 Impact of the Six Sigma method

The Impact of Six Sigma goes beyond simply improving the company's product quality. Six Sigma aims to improve the overall performance of company upon the following specific actions:

- Increasing customer satisfaction deeply;
- Holding customer Loyalty through better quality;
- Reducing expenses by drastically diminishing in number of rejects, alterations and waste;
- Optimising the use of the company's assets by increasing the synthetic return rate of the production;
- The increase in turnover is due to cost diminution and quality improvement(Maurice, 2004).

Also, the method makes it possible to organise skills in the company. Decision-making in this condition is dependent on actual data analysis. Finally, it leads to customer satisfaction and operational outcomes by reducing variation and waste resulting from acquiring a competitive advantage (Volck, 2009).

5. Conclusion

The company's main objectives in production are to achieve the acceptable stage of productivity and quality concerning finished products, raw materials and elementary components with a material use rate aimed to benefit from scrap and waste obtained in production.

In Algeria, even the number of quality-certified companies is in progress(66 companies are certified since 2001 in different sectors, appendix1)

Therefore, the question of performance should be automatically raised, especially for many certified companies wishing to develop their management practices through quality beyond the requirements of the ISO standard only.

Among reliable quality tools, the Six Sigma method is applicable and efficient for many activities. It could provide companies with measurable and effective actions to reduce losses and costs related to non-quality; this efficiency involves meeting the client's needs and requirements. As result to the hypothesis, this approach is essential to total quality management; given its interest in improving the product quality and company's performance, in addition to successful experiences to embark six sigma notably in emergent countries, making this method within the reach of certified Algerian companies somewhat, with some remarks or Suggestions as follow:

- ISO certification should not be a purpose in itself but must be integrated into a dynamic company strategy using necessary tools that lead to performance.
- The necessity embracing the Six Sigma method by all Algerian companies.
- To involve managers (top, middle and low management) in practising this method.
- Make available the necessary instruments (technical, financial, and) to apply the method successfully.
- Training and raising the awareness of the human resources, since the human factor is the central element of total quality management, whereas, without the common will to do well, the expected results becomes beyond

range.

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Appendix.1 List of the Algerian companies supported by Qcm andcertified ISO 9001

N°	Companie	ACTIVITES	LOCALISATION	Year	CERTIFICATOR
1	ERO	Récupération	ORAN	2001	OMI – CANADA
2	ALRIM	Fabrication de	ALGER	2002	SGS –France
3	SONATRACH - GL2Z	Production de GNL	ARZEW	2002	SGS –France
4	BRC	Engineering	ALGER	2002	VINCOTTE –

5	KAHRAKIB	Grands travaux	ALGER	2002	VINCOTTE –
6	BKL	Fabrication de	BLIDA	2002	SGS –France
7	IRRAGRIS	Production	B.B.A	2003	SGS –France
8	BAG	Production de	BATNA	2003	SGS –France
9	HYDRO.AMENAGEMENT	Grands travaux	ALGER	2003	OMI – CANADA
10	E.L.S	Fabrication	ALGER	2003	SGS –France
11	SAEL	Fabrication de	ALGER	2003	SGS –France
12	TRANSMEX	Transport	ALGER	2003	VINCOTTE –
13	COLAITAL	Fabrication de lait	ALGER	2003	SGS –France
14	CONSERVERIE	Conserve de fruits	BLIDA	2003	SGS –France
15	COSIDER - ALREM	Maintenance engins	ALGER	2004	VINCOTTE –
16	GTP	Grands travaux	ALGER	2004	VINCOTTE –
17	CSZ – GTP	Formation de	ARZEW	2004	VINCOTTE –
18	NOVER	Fabrication de	CHLEF	2004	VINCOTTE –
19	HYDRO PROJET OUEST	Engineering	ORAN	2004	VINCOTTE –
20	SOMIVER	Fabrication de	BOUMERDES	2004	SGS –France
21	ALVER	Fabrication de	ORAN	2004	VINCOTTE -
22	FOREMHYD	Forages	ALGER	2005	VINCOTTE -
23	MOUBYDAL	Fabrication de	ALGER	2005	TUV -
24	HELIOS - SONATRACH	Fabrication	ARZEW	2005	VINCOTTE -
25	SONATRACH - GL1Z	Production de GNL	ARZEW	2005	VINCOTTE -
26	SONATRACH -TRC - DRC	Réparation	ARZEW	2005	SGS - FRANCE
27	SETA	Études	ANNABA	2005	VINCOTTE -
28	AFRICAVER	Fabrication de verre	JIJEL	2006	VINCOTTE -
29	GL4Z	Production de GNL	ARZEW	2006	SGS
30	COSIDER TP	Travaux publics	ALGER	2006	VINCOTTE -
31	SONATRACH -GTH	Travaux	ANNABA	2007	SGS
32	BEREG	Bureau d'études	ALGER	2007	VINCOTTE -
33	SPH	CATERING	RELIZANE	2007	VINCOTTE-
34	CLINIQUE AL AZHAR	Médicaux	ALGER	2007	VINCOTTE-
35	CFIC	Formations	ALGER	2008	VINCOTTE-
36	SODISMAC	Distribution	ALGER	2008	VINCOTTE-
37	CIMET	Réalisation	ALGER	2008	VINCOTTE-
38	BINAMA	Travaux électriques	ALGER	2008	VINCOTTE-
39	HYDRO - TRAITEMENT	Travaux	ALGER	2008	VINCOTTE-
40	CCTE	Contrôle technique	Hassi Messaoud	2008	VINCOTTE-
41	URBATIA	Etudes dans les	TIARET	2008	VINCOTTE-
42	GOUMIDI	Fabrication de	BLIDA	2009	MOODY
43	Trouvay § Cauvin	Commercialisation	ALGER	2009	VINCOTTE-
44	GP2Z - SONATRACH	Production de GPL	ARZEW	2009	VINCOTTE-
45	MAUGUIN	IMPRIMERIE	BLIDA	2009	VINCOTTE-
46	INFRARAIL	Infrastructures	ALGER	2009	MOODY
47	INATEL	Fab. d'appareils	TLEMCEN	2009	MOODY
48	INTERSUD	Montage electrique	EL OUED	2009	TUV
49	GL1K	Production de GNL	SKIKDA	2009	VINCOTTE-
50	EPIC – ERMA	Eclairage publics	ALGER	2010	VINCOTTE
51	PETROGAZ	Engineering	ALGER	2011	AFAQ-AFNOR
52	ENAC	CANALISATION	ALGER	2011	SGS
53	KAHRAMA	Dessalemen t d'eau	ARZEW	2011	VINCOTTE
54	SOSAPAL	Equipements pour	ALGER	2012	MOODY
55	VIGIL GRUP	SECURITE	ALGER	2012	TUV
56	PETROSER	Production de	ALGER	2012	SGS
57	HELISON	Production	SKIKDA	2014	VERITAS
58	EPAL	Entreprise du port	ALGER	2015	SGS
59	Cosider Engineering	Etudes GC	ALGER	2015	INTERTEK
60	COSIDER CARRIERES	Exploitation de	ROUIBA	2015	VINCOTTE
61	2M INDUSTRIES	Fabrication	ALGER	2016	VINCOTTE
62	SLR	Fabrication de	KOLEA	2016	VINCOTTE
63	COSIDER .O.A	Réalisation	ROUIBA	2017	VERITAS
64	SARPI	Réalisation	ALGER	2017	TUV
65	I2B	Veille légale	ALGER	2017	VERITAS
66	ORSIM	Fabrication	OUED RHIOU	2017	VERITAS

Source:https://www.qcm-dz.com/liste_references.html