The Relationship between Quality, Benchmarking, Reliability and Globalization in Industrial Engineering Activity

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ABSTRACT

The study is perhaps the first to evaluate and establish the relationship between Quality, benchmarking, Reliability and globalization in industrial engineering activity in Emirates, where the study was conducted on international companies operating in Dubai. The study seeks to understand the impact & effect of globalization on all the various topic of industrial engineering that distinguish implementing quality management program, reliability program and ISO certified and benchmarking companies from none implemented benchmarking or quality, reliability, ISO program. Also the study tries to evaluate the effect of these factors on the organizational performance. The study found a number of significant relationships between the reliability, and globalization in industrial engineering activity. It also found support for the argument that high reliability, high quality and benchmarking practices will improve industrial engineering and at the end result will improve overall organizational performance in large, medium and small global businesses. Therefore the results achieve the goals of industrial engineering to eliminate wastes of time, cost, materials, energy, and other resources to increase profits.

Keywords: Reliability, Globalization, Industrial engineering, Quality, Performance, Management, Benchmarking, efficiencies, effectiveness.

العلاقة ما بين الجودة , مقارنة مرجعية , المعولية والعولمة في نشاطات الهندسة الصناعية

الخلاصة

تعتبر هذه الدراسة هي الأولى ربما لتقييم وتحديد العلاقة بين الجودة ومقارنة مرجعية والمعولية(الموثوقية) والعولمة في نشاطات الهندسة الصناعية في الإمارات، حيث أجريت الدراسة على الشركات العالمية العاملة في دبي. وتسعى الدراسة إلى فهم العلاقة في اثر وتأثير العولمة على مختلف المواضيع التي تهتم بها الهندسة الصناعية كما تحاول الدراسة معرفة تاثير العولمة والمعولية على ألاداء التنظيمي للشركات التي تعتمد في تطبيق و تنفيذ برامج إدارة الجودة، والمعولية وبرامج شهادة الايزو والشركات التي لاتعتمد تلك البرامج . تم ايجاد عدد من العلاقات الايجابية المؤثرة ما بين المعولية والعولمة في نشاطات الهندسة الصناعية. كما وجدت نتائج البحث دعم الحجة والمقولة النظرية التي تدعم بأن الشركات ذات المعولية العالية، وذات جودة الانتاج العالية والتي تطبق برامج

وممارسات أدارة الجودة ووضع المعايير العلمية في الهندسة الصناعية من شانها تحسين الأداء التنظيمي العام في الشركات العالمية الكبيرة والمتوسطة والصغيرة. ولذلك فإن نتائج البحث تؤدي الى تحقيق الهدف المنشود من أهداف الهندسة الصناعية بالقضاء وتقليل الضياعات في الوقت والكلفة والمواد والطاقة، وغيرها من الموارد وبالتالي تؤدي الى زيادة الأرباح.

INTRODUCTION

The various topics of concern to industrial engineers include management science, financial engineering, engineering management, supply chain management, process engineering, operations research, systems engineering, ergonomics, cost and value engineering, quality engineering, facilities planning, and the engineering design process. Traditionally, a major aspect of industrial engineering was planning the layouts of factories and designing assembly lines and other manufacturing paradigms. At these days lean manufacturing systems and industrial engineers work to eliminate wastes of time, money, materials, energy, and other resources. Therefore the Industrial engineering is concerned with the development, improvement, implementation and evaluation of knowledge, information, equipment, analysis and synthesis, as well as to evaluate the results to be obtained from such systems or processes. The importance of product quality, service quality is not only the challenge facing globalization businesses and industrial engineering. Improving quality is no longer considered as the duty of the manufacturing engineering department or quality control department it is every body's job from top management to the normal employment in the organization. Therefore the quality improvements become a philosophy and a way of life.

In addition to quality factor and a rapidly changing market place there is new challenge in the twenty-first century. It is increased globalization which brought pressure on industrial engineering planning and on all business and industries to be more competitive both in price and quality to succeed even in their domestic markets. It has become essential in global competitive environment to the organizations to be ready to take rapid action to facing these pressures to achieve high reliability, high efficiency, high performance, and high service level. Jung and Jian Wang (2009) pointed recent trend of globalization challenges firms to become more than ever competitive. Firms are realigning their competitive strategies by incorporating the unprecedented globalization trend while continuously trying to maintain or increase their competitive advantages.

To achieve the above challenges, the reliability, quality, benchmarking are the central terms used in assessing and measuring the high or low performance of the organization in both profit and non profit, manufacturing or services organizations to help improving each business activity of the organization and to improve their competitive positions in the market.

Therefore the main objective of the organization should be clearly defined that the customer satisfaction and continuous improvement is not only the final objective but continuous maintain sustainable growth to remain successes in the markets as competitive and effective organization.

LITERATURE SURVEY

The reliability was defines by Sunil & Galletti (2010) as the probability that the unit will perform its intended function under normal conditions. The important of reliability pointed by Ruiz-Torres (2009) NASA and its contractors are currently in the process of the developing the Orion spacecraft, the space transportation system that will replace the Space Shuttle as the US's manned vehicle. The Orion spacecraft is a component of the Constellation Program, whose aim is the continued exploration of space, focusing on a return to the Moon and future travel to Mars and beyond. A key goal of the Constellation Program is to increase the safety, reliability, and cost efficiency of space transportation.

While (Kumar & Choisne 2009) pointed the important of the quality, they clarified that the quality has become a powerful strategic weapon in international competition and trade. Improved quality by industrial engineering reduces waste and increase productivity. Further, improvements in quality and productivity enable firms to increase their market share and to charge higher prices for their products, which in turn, results in high profitability. The importance of quality for company's performance and success on the market is widely recognized in business literature and practice (Crosby, 1986; Deming, 1986; Juran, 1992). Numerous approaches to management of quality were suggested, in order to help companies improve efficiency and competitiveness through improvement of quality.

The benchmarking define by Brah (2000), as the continuous, systematic process for evaluating the products, service and work processes with those recognized as representing the best practices, for the purpose of organizational improvement. It involves systematic effort to learn and incorporate product and process innovations that have proven successful.

Also a Goncharuk(2009), clarify the Benchmarking as the best tools that allows to define the opportunities of improvement, key success factors and ways of increase of efficiency of the company .

Meybodi (2009) stated that in a global market, knowing how the best organizations conduct their business is a critical element of successful competition. Benchmarking is a valuable tool that provides an opportunity to learn from other organizations. It is an effective means for learning and change because it exposes employees to new approaches, systems, and procedures. However, it has become essential that the organizations and companies are seeking any opportunities to improve the efficiency and effectiveness of their business performance and to improve their quality, reliability, benchmarking and overall performance.

By reviewing the paper of Cagnazzo (2010), he highlights the role of performance measurement systems to support quality improvement initiatives at supply chain –wide level, identifying the main critical success factors for a successful quality improvement initiative implementation.

Through inspection in many research and specialized periodicals in the relationship between reliability, globalization and industrial engineering, we did not find research dealing with such relationship which indicates a lack of such specialized research in

the existing literature. It is very essential and important to find such relations for these terms in the benefits of future research in Industrial Engineering.

Brah (2004) examines the relationship between total productive maintenance and performance. He is conclude appositive correlation between TPM and business performance shown by all the six general constructs of corporate planning, top management leadership, human resource focus, process focus, total quality management focus and information system focus.

As a result of lack of research in this topic, it is necessary, to study the reorienting and redesigning the operational strategies, planning strategies, quality program, reliability performance, Technology performance and benchmarking of the organization and to study the relationship between these factors in order to find what is the best way to improve the overall organization performance.

The performance measurement and evaluation stated by Guerra-Lopez and Leigh(2009) ,they believed that predictability improving performance depends not only on setting performance goals, and certainly not only on implementing solutions, but also on continuously tracking progress toward desired goals and taking corrective actions as required.

Golafshani (2003) believes the use of reliability and validity are common in quantitative research and now it is reconsidered in the qualitative research paradigm. The quantitative research is employ experimental methods while qualitative research uses a naturalistic approach that seeks to understand phenomena in context –specific selling ,such as real world setting. Given the use of reliability in the various fields of science and fields, Maybe we abbreviate in this research to know the reliability of data used to ensure the quality and comprehensiveness of the data used in the search and to extent to which results are consistent over time and an accurate representation of the total population. The second use and it is very important is to examine the reliability of the entire System, organizations and through this examination we examine the variables affecting the company and the relationships between these variables on the overall performance systems.

METHODOLOGY

Based on the literature, the study has adopted new technique to combine reliability and, globalization with various topics of the industrial engineering such as quality engineering, management science, process engineering, operations research and systems engineering. Therefore we used a combination of Reliability, Quality, Benchmarking and globalization Relationship (RQBGR) as a measurement method for this study to achieve an overall efficiency of organizations managed. The tools used for measuring the reliability are employee reliability, external reliability, delivery reliability, process reliability, product reliability, safety and technology performance. The tools used for measuring quality management practices are top management leadership, strategic planning, information and analysis, customer focus, process management, human resource and quality focus.

The tools used for studying business performance are the cost, customer satisfaction, employee satisfaction and flexibility. Finally the tools used for measuring

the benchmarking are driving forces, objectives of benchmarking, top management support, internal assessment, employee participation, benchmarking process, benefit and pitfalls in benchmarking.

The main hypotheses used are consisting of four hypotheses which postulated to examine the relationship of each variables of the (RQBGR). A survey comprising one hundred and sixty two questions was administered to a sample of three hundreds global large, medium and small companies employing ten to more than five hundred workers and covering all sectors in United Arab Emirates. The questionnaire asked the participants to indicate on a five-point Likert scale. SPSS Statistical analyses were conducted to calculate reliability analysis, correlation and regression.

Objective Of The Study

The main objective of this study is to investigate the relationship between reliability and globalization in industrial engineering in general and in the company that practices business in the Emirates. We seek to examine all the factors that distinguish the companies which implementing quality management program, reliability program, ISO certified and those company none implementing benchmarking. We also investigate the impact of these factors on the organizational performance in globalization environment.

Study Hypotheses

We develop the following formal hypotheses and we will test them statistically based on the results of the survey. The following primary and main hypothesis of this research

H1: There is a significant positive relationship between Reliability, Quality and Benchmarking with respect of business performance of an organization.

H2: There is a significant positive relationship between Reliability, Quality and Benchmarking with respect of globalization.

H3: There is a positive correlation between reliability and business performance of an organization.

H4: There is a significance difference between experienced and inexperienced reliability, quality, and benchmarking firms in terms of business performance.

Rqbgr Model Architecture

The model used in this study is shown in (Figure 1) and it is based on the literature and the specific model From the Choisne (2007) study. The core of this model is based on the assumption that quality, reliability, benchmarking is positively and highly correlated with superior performance. This relation is affected by different moderating variables: the time (number of years after quality program adoption), as well as the economic and industry characteristics (Block 5).

Moreover, the impact of quality practices (Block 1) and the impact of reliability (Block 2) and the impact of benchmarking (Block 3) on organization operating performance (Block 4) can be enhanced and adequately assessed only with the use of proper performance measures and systems (Block 6).

The quality, reliability and Benchmarking practices considered here (Block 1, 2, 3) are the listed in the QRB criteria and include: leadership, information and analysis, strategic quality planning, human resource utilization, quality assurance and products

and services, quality results. With regard to company operating performance (Block 4), the model embodies the four key measurable areas of company's operations that were used in Choisne (2007) study and could demonstrate the impact of quality practices on corporate Performance: employee relations, operating procedures, customer satisfaction, and financial performance. Finally, only the main moderating variable is the effect of the time was taken into account in this study.

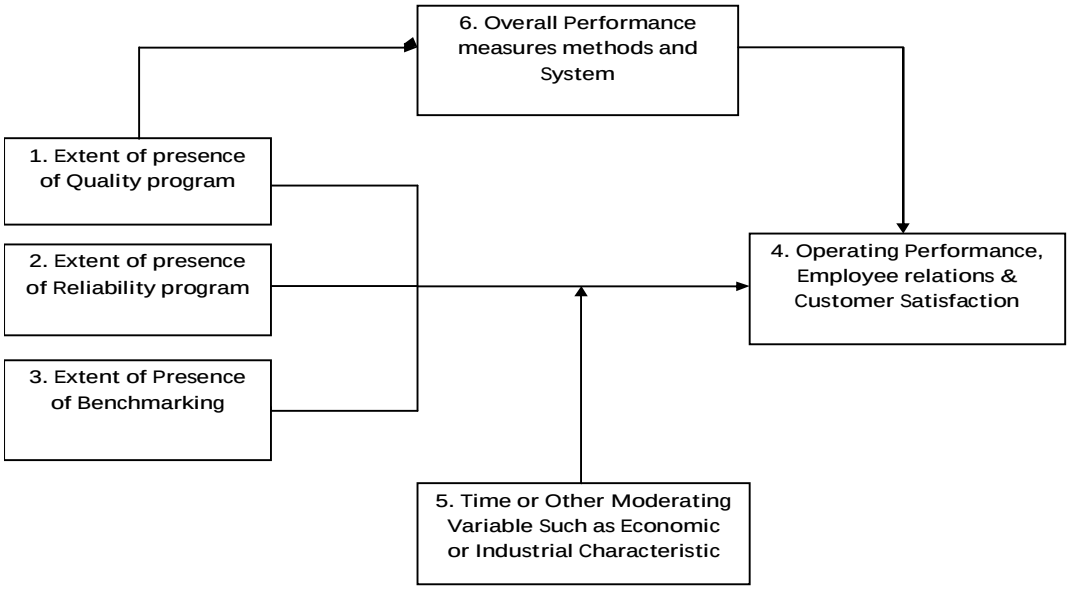

Figure (1) Research Model

RESULTS & ANALYSIS:

We send out 400 survey questionnaires, we received a total of 160 usable responses giving a response rate of 40 percent. From the respondent the service provider is 82.5 percent, manufacturing firms is 7.5 and unknown is 10 percent. For more details Table (1) provides a complete profile of the responded companies. In

order to highly loaded on one factor not on other and in order to transform the factor matrix in to another form we used factor analysis, factor loading extraction and varimax rotation as shown in the samples of these analysis tables (2),(3) and (4). The next analysis was performed to find the reliability of the data; we used Cornbach's alpha (α) testing to assess the reliability scales as shown in Table (5).
The other analysis was performed to determine Pearson's Correlation to measure the internal correlation for each main factor as shown in table,(6) (7)and (8) and then performed correlation for group factors as shown in tables(9) and (10) to establish
1. Correlation between reliability and the performance variables as representative of industrial engineering.
2. Correlation between quality, benchmarking variables and performance as representative of industrial engineering.
In addition a comparing were used to test any significant differences in business performance of organization practices reliability ,benchmarking and quality as variable of industrial engineering and inexperienced such practices under global environmental. The main hypothesis in our study is to find out if the reliability program implementation correlates with better business performance as a measured by employee reliability, external reliability, delivery reliability, process reliability, productive reliability, safety and technology performance.
The second main hypothesis is to find out if the quality management program implementation correlates with better industrial engineering variable represented by business performance as a measured by top management leadership, strategic planning, information and analysis, customer focus, process management, human resource management and quality focus.

Table (1) Demographic profile of respondents in GCC

1. **Nature of company**	**Number**	**Percentage**	
Manufacturing	12	7.5	
Wholesale/retail trade	21	13.125	
Distribution	12	7.5	
Services*		99	61.875
Unknown	16	10	
2. Nationality of company			
Local	105	65.625	
Foreign	50	31.25	
Joint venture	5	3.125	
3. ISO			
Yes	112	70	
No	48	30	

4. Benchmarking		
Yes	100	62.5
No	60	37.5

5. No of Employee	**Number**	Percentage
20 or Less	15	9.375
21-50	11	6/875
51-100	66	41.25
101-500	15	9.375
501 or more	53	33.125

6. Years of operation		
> 1 YEAR	32	20
1-3 Year	49	30.625
<4 Year	79	49.375

7. Org. Implementing Q. Management Program		
Yes	120	75
No	40	25

Note: *Banks, Logistics, Construction, Hospitality, Repair and maintenance, Healthcare and Consultancy

Reliability Scale results of 160 respondents shown that our data was accurate and it was standard reliability data because, The first set of factors in the table represented the Quality Program Practices Measurements and the Average Value of the (α) is = 0.845 and the second set of factors relates to the Business Performance Measurements which represented by with Average value of the (α) is = 0.69625.The third set of factors relates to the Reliability Practices Measurements represented by with Average value of the (α) is = 0.80928

The forth set of factors relates to the Driving Forces and Objectives of Benchmarking Practices Measurements represented by average value of the (α)is =0.7355. The fifth set of factor relates to the Pre-Conditions for Benchmarking Practices Measurements represented by average Value (α) = 0.7855 . The final set of factors in the table relates to the Benchmarking Process Practices Measurements represented by Average Value (α) = 0.7986. From these result we can conclude that our data reliability scale value is over the minimum acceptability Cornabach's standard (α = 0.70).

Table (6) which represents the upper and lower limit for the correlation for Quality practices adopted by companies, Table (7) represents the upper and lower limit for the

correlation for operational performance, Table (8) represent the upper and lower limit for the correlation for reliability performance, Table (9) represents the upper and lower limit for the correlation for PART 2 Section (A) driving forces and objective of benchmarking and Table (10) represents the upper and lower limit for the correlation for benchmarking process and benefits of benchmarking .From the above tables we can conclude table (11) which represented the highest correlation value of benchmarking, customer focus and reliability. These high values show that's the respondent completely agree for the Hypotheses no (1), (2),(3) and (4) There is a significant positive relationship between Reliability, Quality and Benchmarking which represented the factors of industrial engineering with business performance of an organization.

Table (2) shows the results of the factor loading extraction and varimax rotation.

	Initial	Extraction
top1	1.000	.702
top2	1.000	.742
top3	1.000	.672
top4	1.000	.613
top5	1.000	.648
st1	1.000	.711
st2	1.000	.689
st3	1.000	.686
st4	1.000	.666
info1	1.000	.727
info2	1.000	.776
info3	1.000	.783
info4	1.000	.676
qu6	1.000	.749

Extraction Method: Principal Component Analysis.

Table (3) shows the results of the Variance and factor loading of the variable Total Variance Explained.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	15.185	46.014	46.014	15.185	46.014	46.014
2	2.432	7.371	53.385	2.432	7.371	53.385
3	1.758	5.328	58.714	1.758	5.328	58.714
4	1.558	4.720	63.434	1.558	4.720	63.434
5	1.189	3.602	67.036	1.189	3.602	67.036
6	1.111	3.366	70.402	1.111	3.366	70.402
7	.950	2.878	73.280			
8	.827	2.505	75.785			
9	.743	2.252	78.037			
10	.666	2.019	80.056			
33	.085	.258	100.000			

Extraction Method: Principal Component Analysis.

Table (4) shows the results of the factor loading extraction and varimax rotation of the variable.

Component Matrix (a)

	Component					
	1	2	3	4	5	6
top1	.720	-.326	-.213	-.166	-.014	-.069
top2	.690	-.490	.042	-.126	-.064	-.059
top3	.789	-.114	.000	-.117	-.035	-.147
top4	.707	-.209	.062	-.042	.083	-.239
top5	.697	-.226	-.212	.192	-.144	-.093
st1	.689	-.409	-.183	-.083	.151	.080
st2	.616	-.032	.138	-.483	.197	.134
st3	.711	-.239	-.062	-.270	.208	.059
st4	.719	-.238	.279	.029	-.029	-.115
info1	.757	-.349	-.061	.030	-.161	-.035
info2	.775	-.339	.194	.098	-.117	-.022
info3	.708	-.150	-.188	.239	-.380	-.148
info4	.629	.064	.248	-.081	-.415	.190

Table (5) showing the Cronbach's Alpha (Reliability Scale) results of 160 respondents.

No	Factors	Cronbach's Alpha (Reliability Scale)	N of Items
1	Quality Practices Measurements represented by	Average Value = 0.845	
	(1). Top Management Leadership	0.876	5
	(2).Strategic Planning	0.833	4
	(3).Information & Analysis	0.836	4
	(4)Customer Focus	0.840	5
	(5)Process Management	0.865	4
	(6)Human resource management	0.841	5
	(7)Quality Focus	0.825	6
2	Business Performance Measurements by	Average Value = 0.69625	
	(1).Cost	0.771	5
	(2)Customer Satisfaction	0.573	2
	(3).Employee Satisfaction	0.675	2
	(4).Flexibility	o.766	3
3	Reliability Practices Measurements by	Average Value = 0.80928	
	(1).Employee Reliability (Inter –Organizational)	0.823	6
	(2).External Reliability	0.889	5
	(3)Delivery Reliability	0.820	4
	(4) Process Reliability	0.836	4
	(5) Productive Reliability	0.775	6
	(6) Safety	0.628	2
	(7) Technology Performance	0.894	5
4	Driving Forces and Objectives of Benchmarking Practices Measurements represented by	Average Value = 0.7355	
	(1).Reason for Introduction Benchmarking	0.669	5
	(2) Possible Objective of Benchmarking	0.802	6
5	Pre-Conditions for Benchmarking Practices Measurements represented by	Average Value = 0.7855	
	(1) Top management Support	0.868	4
	(2)Company's Culture	0.549	2
	(3) Internal Assessment	0.868	4
	(4) Employee Participation	0.857	4
6	Benchmarking Process Measurements by	Average Value = 0.7986	
	(1).Benchmarking Process	0.894	4
	(2) Important Type of Benchmarking	0.552	4
	(3) Benefits of benchmarking	0.927	8
	(4). Pitfalls' in Benchmarking	0.941	20
	(5). Reasons for Starting the Benchmarking	0.778	4
	(6). Possible Objective of Benchmarking	0.700	4

Table (6) represents the upper and lower limit for the correlation for Quality practices adopted by companies.

Details	Upper limit		Lower limit	
	Code	Value	Code	Value
1.TOP MANAGEMENT LEADERSHIP CORRELATION (TOP)	TOP 2	0.702	TOP 5	0.524
2.STRATEGIC PLANNING CORRELATION (ST)	ST 4	0.630	ST 2	0.459
3. INFORMATIO AND ANALYSIS CORRELATION (INFO)	INFO 2	0.718	INFO 4	0.446
4.CUSTOMER FOCUS CORRELATION (CU)	CU3	0.792	CU 5	0.363
5.PROCESS MANAGEMENT CORRELATION (PR)	PR 3	0.690	PR 4	0.553
6.HUMAN RESOURCE MANAG. CORRELATION (HU)	HU 5	0.672	HU4	0.327
7.QUALITY FOCUS CORRELATION (QU)	QU 6	0.629	QU 2	0.314
FINAL UPPER LIMIT AND LOWER LIMIT FOR SECTION (B)	CU 3	0.792	QU 2	0.314

Table (7) represents the upper and lower limit for the correlation for operational performance.

Details	Upper limit		Lower limit	
	Code	Value	Code	Value
1.COST (OP)	OP 3	0.587	OP 4	0.193
2.CUSTOMER SATISFACTION (CUS)	CUS 2	402	0000	0000
3. EMPLOYEE SATISFACTION CORRELATION (EM)	EM 2	0.510	0000	0000
4.FLEXIBILITY CORRELATION (FL)	FL3	0.717	FL 1	0.427
FINAL UPPER LIMIT AND LOWER LIMIT FOR SECTION (C) OPERATIONAL PERFORMANCE	FL3	0.717	OP 4	.193

Table (8); represent the upper and lower limit for the correlation for reliability performance.

Details	Upper limit		Lower limit	
	Code	Value	Code	Value
1.EMPLOYEES RELIABILITY CORRELATION (EMP)	EMP 4	0.666	EMP 3	0.120
2.EXTERNAL RELIABILITY CORRELATION (EXT)	EXT 2	0.727	EXT 4	0.520
3. DELIVERY RELIABILITY CORRELATION (DEL)	DEL 2	0.702	DEL 4	0.448
4.PROCESS RELIABILITY CORRELATION (PRO)	PRO2	0.691	PRO 4	0.419
5.PRODUCTIVE RELIABILITY CORRELATION (PROD)	PROD 2	0.594	PROD 6	0.095
6. SAFETY CORRELATION (SAF)	SAF 2	0.458	0000	0.000
7.TECHNOLOGY PERFORMANCE CORRELATION (TEC)	TEC 2	0.720	TEC3	0.485
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FINAL UPPER LIMIT AND LOWER LIMIT FOR RELIABILITY PERFORMANCE	EXT 2	0.727	PROD 6	0.095

Table (9) represents the upper and lower limit for the correlation for PART 2 Section (A) driving forces and objective of benchmarking.

Details	Upper limit		Lower limit	
	Code	Value	Code	Value
1.REASON FOR INTRODUCING BENCHMARKING CORRELATION (RE)	RE 3	0.721	RE 5	-0.023
2.POSSIBLE OBJECTIVE OF BENCHMARKING CORRELATION (POS)	POS 4	0.793	POS 6	-0.118
3. PRE CONDITION TOP MANAGEMENT SUPPORT (COND)	COND 3	0.758	COND 4	0.501
4.COMPANY CULTURE CORRELATION (COM)	COM 2	0.383	0000	00000
5.INTERNAL ASSESSMENT CORRELATION (INTR)	INTR 2	0.773	INTR 4	0.466
6.EMPLOYEE PARTICIPATION CORRELATION (EMPL) ----------	EMPL 2	0.687	EMPL 4	0.511
----------FINAL UPPER LIMIT AND LOWER LIMIT FOR BENCHMARKING PRE CONDTION AND DRIVING FORCE	----------	----------	----------	--------
	POS 4	0.793	POS 6	-0.118

Table (10) represents the upper and lower limit for the correlation for benchmarking process and benefits of benchmarking.

Details	Upper limit		Lower limit	
	Code	Value	Code	Value
1. BENCHMARKING PROCESS CORRELATION (BENCH)	BENCH 2	0.789	BENCH 3	0.551
2.TYPE OF BENCHMARKING CORRELATION (THE)	THE 3	0.543	THE 4	0.172
3. BENEFITS OF BENCHMARKING (SEC)				
4.STATMENTS REQARDING BENCHMARKING(FOLL)	SEC 2	0.746	SEC 8	0.436
5.PROBLEM ENCOUNTENED IN BENCHMARKING (LAC)	FOLL 1	0.813	FOLL 3	0.703
6.POSSIBLE REASON STARTING BENCHM. (ARE 4)	LAC 2	0.715	LAC 15	0.070
7.POSSIBLE OBJECTIVE OF BENCHMARKING (ARE 5)	ARE 42	0.643	ARE 44	0.306

FINAL UPPER LIMIT AND LOWER LIMIT FOR BENCHMARKING PRE CONDTION AND DRIVING FORCE	ARE 52	O.646	ARE 53	0.451
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	BENCH 2	0.789	LAC 15	0.070

DISCUSSION

(1) Problems and constraints in the compilation of the results of the questionnaire*:*

A. Questionnaires were distributed to many international companies, institutions and productivity and we found difficulty in getting answers via email.

B. The most of large companies operating in the United Arab Emirates are from foreign companies and the primary concern is profit and for that reason we did not find interest in research from them.

C. Because of the type of the information's of the questionnaire, we faced difficulty in finding people familiar with all these questions disciplines .

D. Because of the large size of the questionnaire we faced difficulties to get answered because it is time consuming.

E. Because of the concern of most corporate managers and specialists in their daily work and the importance of and lack of time prevents them from answering all those questions accurately.

F. Some companies are giving information for the purposes of research are often seen as being desirable to disclose the secrets of the company.

(2) Solutions adopted to address these constraints and problems**:**

A. We extend the time for an answer the questionnaire many times.

B. We agreed to change the methods of getting the answer from e-mail to get the answer through direct interview of managers and specialists companies personally and to discuss with them.
C. This method took more time and effort in scheduling appointments and interviews to get answers and despite all the efforts we get precise answers.
D. We find the new way for a personal experience is unique because of access to personal experiences of those companies, especially the giant companies and therefore the interest was very great and extraordinary through personal interviews.
E. We conclude as a result of those interviews approval and satisfaction to the quality, accuracy and comprehensiveness of the questionnaire and therefore the results were excellent because they carry the credibility and accuracy of the answer by managers and specialists. That method helped us to neglect some of the answers for companies that do not have the specialists and this is what gives the results of the questionnaires high reliability and accuracy of the answers.

By review the results of reliability test from Table (1) which show high Average Cronbach's Value of (α=0.793) and the lowest average value (α=0.717) which indicates high reliability of scales for the entire group tested.

From the summery of Correlation results in Table (11) indicated highest correlation between benchmarking and customer satisfaction and the reliability. This is clear and a positive respond which agree with our hypothesis that is a significant positive relationship between Reliability, Quality and Benchmarking with respect of business performance of an organization.

Again a positive respond we get from respondent to the second hypothesis that is a significant positive relationship between Reliability, Quality and Benchmarking with respect of globalization.

From the results we found the lowest correlations value indicated of respondent agreed to our hypothesis, there is a significance difference between experienced and inexperienced reliability, quality, and benchmarking firms in terms of business performance because the lowest value of correlations represented inexperienced companies with low performance.

CONCLUSIONS

1- This study developed questionnaire technique which is a combination of Reliability, Quality, Benchmarking and globalization Relationship (RQBGR). It is used as a measurement tools.
2- By using this technique a number of significant positive relationships between the reliability, and globalization in industrial engineering were developed as shown in table (12) which contains complete summary results of the test hypotheses. It was found support for the argument that high reliability, high quality and benchmarking practices will improve industrial engineering activity. It will improve overall organizational performance in large, medium and small global businesses.
3- Most of respondent who are adopted reliability program placed great important on reliability in term of increased productivity, reduction in late delivery and increase

product in perfect condition on delivery as well as the reliability improves all the discipline of the employee with decreasing the defect and rework .

4- The experienced companies' respondent agreed on the benefits was achieved from adopted reliability, quality and benchmarking. While inexperienced companies they are not aware of or not understand the concepts of reliability program in industrial engineering. The study highlights the importance of reliability, quality and benchmarking relationship with globalizations and its effect on industrial engineering activity and on overall organization performance.

Table (11) represents the upper limit for the highest correlation for all respondents.

No	Factors	Correlation	Remark
1	Customer Focus Correlations	0.792	
2	Employee Satisfaction Correlation	0.717	
3	Internal Reliability Correlation	0.727	
4	Objective of Benchmarking	0.793	Highest
5.	Benchmarking Process	0.789	

Table (12) results of Hypotheses testing.

Study objective	Hypotheses	Results
H1: There is a significant positive relationship between Reliability, Quality and Benchmarking with respect of business performance of an organization.		Supported
H2: There is a significant positive relationship between Reliability, Quality and Benchmarking with respect of globalization.		Supported
H3: There is a positive correlation between reliability and business performance of an organization.		Supported
H4: There is a significance difference between experienced and inexperienced reliability, quality and benchmarking firms in terms of business performance.		Supported

REFERENCES

[1]. Jung and Y. Jian Wang J. Y. (2009) ," Competitive strategy, TQM practice, and continuous improvement of international project management A contingency study"International Journal of Quality & Reliability Management Vol. 26 No. 2, 2009 pp. 164-183

[2]. Sunil Kumar and Rachita Gulati(2010),Measuring efficiency,effectiveness and performance of indian public sector banks",International Journal of productivity and performance management Vol.59 No.1,2010 pp 51-74.

[3]. Alex J. Ruiz-Torres , J. Zhang (2009) "A reliability, maintainability, and safety model to support the assessment of space vehicles "International Journal of Quality & Reliability Management Vol. 27 No. 4, 2010 pp. 486-504.
[4]. Vinod Kumar and Franck Choisne(2009)," Impact of TQM on company's Performance", International Journal of Quality &Reliability Management Vol. 26 No. 1, 2009 pp. 23-37.
[5]. Crosby, P. (1986), Quality Is Free, MIT Press, Cambridge, MA.
[6]. Deming, W.E. (1986), Out of the Crisis, MIT Center for Advanced Engineering Study, Cambridge, MA.
[7]. Juran, J.M. (1992), Juran on Quality by Design, The Free Press, New York, NY.
[8]. Shukat A.Brah and Ai.Lin.Ong (2000), "Understanding the benchmarking process in Singapore", International Journal of Quality & Reliability Management,,vol,17,No.3, 2000,pp.259 -275.
[9]. Anatoliy G. Goncharuk,(2009),Improving of the efficiency through benchmarking:a case of Ukrainian breweries,Benchmarking: An International Journal, Vol. 16 No. 1, 2009,pp. 70-87.
[10]. Meybodi, M. Z. (2009)," Benchmarking performance measures in traditional and just-in-time companies" Benchmarking: An International Journal Vol. 16 No. 1, 2009 pp. 88-102.
[11]. Luca Cagnazzo 2010, " The role of performance measurement systems to support quality improvement initiatives at supply chain level",International Journal of productivity and performance management Vol.59 No.2.2010, pp.163-185.
[12]. Shukat A.Brah and W.k.Chong (2004), Relationship between total productive maintenance and performance,Int.J.Prod.Res.,15 june 2004,vol,42,No.12,2383-2401.
[13]. Ingrid Guerra-López, Hillary N Leigh(2009)" Are performanceImprovement professional Measurably improving performance". Performance Improvement Quarterly. Hoboken 2009. Vol. 22, Iss. 2; p. 97.