

The Relationship Between Total Quality Management Practices and supply chain efficiency in Pharmaceutical corporations in Egypt

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Abstract:

This study was designed to investigate the relationship between the relationship between total quality management practices and supply chain efficiency in public, private and multinational pharmaceutical corporations in Egypt. The instrument of collecting data for this study was a questionnaire. The questionnaires were distributed mainly to supply chain professionals either general managers , supply chain managers, production managers, quality managers, or quality control managers, in pharmaceutical corporations in Egypt who possess sufficient knowledge about TQM practices and supply chain efficiency..

The results supported the relationship between total quality management practices and supply chain efficiency. the researcher proposed a number of recommendations such as:Improving employees skills and capability in facing changing competitive environment, Deployment of IT into supply chain activities, Establish proper Communication channels with suppliers and finally Reinforce quality control function to tackle problems and reduces errors.

ملخص البحث

يتمثل الهدف الرئيسي لهذا البحث في دراسة العلاقة بين ممارسات ادارة الجودة الشاملة وكفاءة سلسلة الامداد في شركات الأدوية العامة والخاصة ومتعددة الجنسيات في مصر. ولدراسة مشكلة البحث تقترح الدراسة فرض رئيسي لدراسة هذه العلاقة ويتكون مجتمع البحث من رئيس الشركة أو مديرين سلاسل الامداد والانتاج ومديري الجودة والرقابة عليها باعتبارهم من يملك المعلومات والخبرات الكافية عن ممارسات ادارة الجودة الشاملة وكفاءة سلسلة الامداد داخل شركات الأدوية. ولجمع البيانات تم تصميم قائمة استقصاء تم توزيعها على عينة البحث داخل شركات الأدوية ، ثم تحليل تلك البيانات باستخدام برنامج التحليل الاحصائي (SPSS) لاختبار مدى معنوية وقوة العلاقة بين متغيرات الدراسة وقد توصلت الدراسة لمجموعة من النتائج أهمها: وجود علاقة معنوية طردية بين ممارسات ادارة الجودة الشاملة وكفاءة سلسلة الامداد داخل شركات الأدوية.

وبناءً على نتائج هذه الدراسة فقد قام الباحث باقتراح عدد من التوصيات للمديرين كان أهمها تحسين مهارات العاملين وقدراتهم لمواجهة اي تغيرات وانشاء قنوات اتصال جيدة بين العملاء وأيضاً الموردین وتعزيز الرقابة علي الجودة لحل اي مشكلات تتعلق بالجودة وتقليل اي خطأ.

Introduction

As global manufacturing has expanded, a key focus has been shifted toward the effective and efficient supply chain and logistics management. Therefore, the firms have realized that supply chain excellence is the crucial source of competitive advantage and business performance (Negi Saurav ,2020; Salehzadeh et al., 2020; Anand and Grover, 2015).

Along the trend of globalization, it is necessary to improve quality beyond a firm's boundaries to its supply chain .Integrating quality management (QM) and supply chain management (SCM) is the effective way for supply chain partners to improve their overall efficiency and competitiveness. (zhong *et al.*, 2016).

In the continually changing global market, quality products alone are no longer enough. New challenges now include a focus on supply to determine the right time and place for product delivery.

International business competition is no longer limited to organizations but now includes the supply chains (Vanichchinchai& Igel ,2018).

TQM has been defined in many ways , particularly as a management Philosophy that encourages cost reduction, the creation of high quality goods and services, customer satisfaction, employee empowerment, and the measurement of results. (Mutingi &Chakraborty , 2018).

On the other hand, Supply chain efficiency becomes a requirement for organizations as it is one of the key measures for supply chain performance and positively influences the firm's overall performance and financial success (Lu et al., 2019; Brandenburg, 2016).

So, the integration between SCM and QM is a natural evolution of management practices and this integration is so far focused on specific features such as purchasing, manufacturing and distribution in order to support logistics processes. So it is necessary to improve the performance by controlling some points such as: cost, efficiency, service levels, rapid response and quality of products and services (Agyabeng et al., 2020).

Section 2 reviews relevant literature. Section 3 outlines the research methodology applied in this research. The results of data analysis are shown in Section 4. Section 5 discusses the main recommendations Section 6 displays limitations and suggests future research.

1. Literature review and conceptual framework

1.1 TQM practices

Introducing TQM practices in an organization is a long-term commitment. The successful implementation and adoption of TQM practices requires planning, time and effort (Vanichchinchai & Igel, 2018).

A number of studies have been carried out to investigate practices of TQM and to examine its implementation process.

TQM practices are tools, techniques and strategies for continuous improvement of quality, usually driven by the need to satisfy customer needs. (Mutingi & Chakraborty, 201).

The application of TQM practices usually requires total or company-wide involvement, including the top management who should ensure that the practices are effectively adopted across various aspects of products, processes and services of the organization. TQM practices are increasingly becoming influential for continuous improvement and innovation initiatives. (Zhong et al., 2016).

1.1.2 TQM Practices and employee performance

According to Khan et al., (2019), in their research undertaken to investigate the effect of TQM practices on performance, reveal that performance is affected by the infrastructural TQM practices such as employee relations, training and top management leadership through core TQM practices such as supplier quality management, process management, product/service design, quality data and reporting.

1.1.3 TQM practices and job satisfaction

Job satisfaction is influenced by a number of people-oriented TQM practices (soft TQM practices). Boon Ooi et al. (2017) established that employees' job satisfaction is impacted by TQM soft practices such as teamwork, organizational trust, reward and recognition, organizational culture and customer focus.

Kabak et al. (2016) revealed that there is a positive effect of TQM practices such as reward and recognition, employee empowerment, training and education, quality culture, and relation and teamwork on employees' job satisfaction.

1.1.4TQM practices and employee affective commitment

Affective commitment reveals the emotional affection of a worker to her/his organization. It denotes the involvement, identification with and emotional fondness of a worker to their organization. Karia and Hasmi Abu Hassan Asaari (2016) emphasized that employees tend to perform well and to participate more efficiently in the growth and success of the company, if TQM practices are implemented successfully.

1.2 Supply chain efficiency

The definition of an efficient Supply chain varies between different companies. According to Pettersson (2018), Three groups of definitions are identified. The groups are performance, cost and a combination of performance and cost. Definitions of efficiency in terms of performance are for example high delivery precision and high customer satisfaction, No cost parts are included when the definition is classified as a performance based definition.

Definition of efficiency in terms of cost means that the definition only relates to cost and no other parts.

One third of the companies in the study have both performance focus and cost focus in their definition. The most common definition is based on the performance. It is about 53 percent of the participating companies are focusing on performance , but Only 10 percent of the companies focus on cost only, and the rest focus on both to keep what is promised , delivery in time, right quantity, right quality and to lowest possible cost. This definition includes both the performance focus and the cost focus.

Labs ; and Negi (2020) said that Supply chain efficiency must ensure that it upholds the promise to the customer while eliminating non-value-add or waste in the process. Supply chain efficiency, therefore, is the measure of getting the right quality product to the right place at the right time at the least cost.

Additionally Stephen(2020) said that supply chain efficiency can be defined as: Providing the right product in the right quantity to a customer when desired, at a fair price with a fair margin, adapting to market changes, remaining flexible enough to accommodate problems, and providing adequate information to all parties.

1.2.1 The Scope of Supply Chain Efficiency

To remain competitive in the new global environment, companies will need to look for ways to reduce costs and improve services in

line .This means that the efficiency and effectiveness of the supply chain will become even more critical.(Negi 2020.(

Stephen(2020) implies that examinations of the efficiency of supply chains often show that many of the activities that take place add more cost than value. When setting up a supply strategy, consideration of both the cost and the level of customer service is essential.

According to Labs (2020), the traditional objective of SCM is to minimize the total cost of the supply chain and to meet the demand. Cutting costs in the supply chain is most likely to affect performance, such as delivery accuracy and lead-time. It is easier to get a short lead time by having buffers, but the cost of the buffers, and therefore the cost of the supply chain, is increasing.

So, to find new areas where costs can be reduced, the business needs to concentrate on the entire supply chain (Pettersson, 2018).

So that, the benefits of using efficiency to maximize overall performance will contribute to lean manufacturing, packaging, inventory management, waste and energy reduction, logistics supply networks, etc.

Efficiency is a suitable method as it supports the conventional cost minimization approach in performance optimization of the supply chain as described by Johnson and Templar(2020).

1.2.2supply chain efficiency and supply chain performance

Many studies are carried out covering the relationship between supply chain efficiency and supply chain performance. It has been

evident that supply chain efficiency is the key measure for supply chain performance and positively influences the firm's overall success.(Nikfarjam, 2015; Brandenburg ,2016; Lu et al., 2018)

Brandenburg (2016) assesses supply chain efficiency and financial performance consistency considering the global economic crisis to be a macro-economic factor. The study focuses recognizes that efficiency and performance depend on the position of the company in the supply chain. To ensure better performance, continuous improvement in supply chain efficiency is needed.

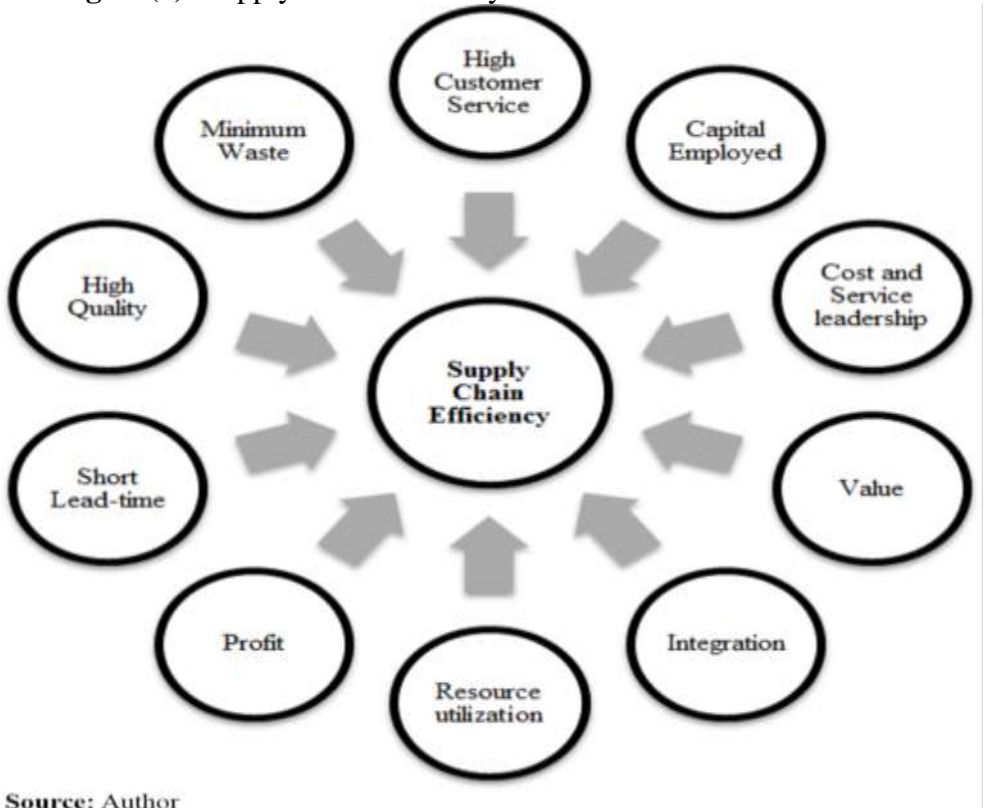
Another study found that effectiveness and efficiency are the most significant factors in supply chain performance with six corresponding indicators (product reliability, employee satisfaction, customer fulfillment, on-time delivery, profit growth and work efficiency).(petterson 2018).

1.2.3 Measures of Supply Chain Efficiency

To evaluate the efficiency of the supply chain, a company needs to have performance measurements. According Negi (2020), if you cannot measure, you cannot manage.

The following figure summarizes different measures of supply chain efficiency.

Figure(1)"SupplyChainEfficiencyMeasures"



Source: Author

The source: Negi (2020)

Leila (2010) used speed, reliability, cost and customer satisfaction in measuring efficiency. While, speed, reliability, cost and customer satisfaction on their own are only measures of effectiveness, when considered in terms of the effect they have on resource utilization in a supply chain they can be used to measure efficiency

Stephen (2020) argued that companies need to be cost-led and service-led to have an efficient supply chain. If a company only measures internal performance measurements, such as order handling time and output in production, the measurements cannot be used to evaluate efficiency in a company, whereas Morse (2018) explain that efficiency is linked to internal performance, particularly when it comes to manufacturing and doing things right.

1.3The integration between TQM practices and SCM

Some studies define the integration between TQM and SCM as the concept of supply chain quality management – SCQM (Lin and Gibson, 2011; Mahdiraji et al., 2012.)

Robinson and Malhotra (2005) stated that SCQM “is the formal coordination and integration of business processes involving all partner organization in the supply channel to measure, analyze and continually improve products, services, and processes in order to create value and achieve satisfaction of intermediate and final customers in the marketplace.” Based on the literature review carried out, it was identified that there is a lack of studies related to the integration of the three dimensions of the SCQM: internal process, upstream QM and downstream QM (Zeng et al., 2013).

SCM assumes a methodical and integrative methodology to manage all the operations and relationships between all the stakeholders of a supply chain. In other words, it integrates all parties of a value chain into one whole entity and manages them as assets of a wide company (Mentzer et al., 2001; Kannan and Tan, 2005; Wang et al., 2004 .)

From the perspective of TQM, SCM could be recognized as providing quality products and services across every organization in the supply chain, to address client’s expectations

According to the literature review it is possible to state that the integration between SCM and TQM is a natural evolution of management

practices and this integration is so far focused on specific features such as purchasing, manufacturing and distribution in order to support logistics processes. So it is necessary to improve the performance by controlling some points such as: cost, efficiency, service levels, rapid response and quality of products and services (Lin et al., 2005).

Both TQM and SCM offer unique frameworks to integrate participation and partnership, since they require participation from all internal functions and continuous collaboration with all external partners . However, TQM focuses more on internal participation, whereas SCM places more emphasis on external partnerships

1.3.1 New Approach of TQM & SCM

TQM and SCM have evolved along similar paths, even though they emerged from different starting points. They diverged in terms of the degree of integration. They both emerged in response to the need to develop tactical strategies for operational functions (inspection and logistics). They then were broadened in scope to gain synergy by integrating the concerns of all interrelated parties. These parties included all internal primary and supportive functions as well as the external business partners.(Robinson and Malhotra, 2015)

Then, there was a shift in focus from operational concerns towards strategic issues.

Consequently, supply chain quality management (SCQM) emerged as a new management concept that combined aspects of TQM with SCM the participation of all members of a supply channel network in the continuous and synchronized improvement of all processes, products, services, and work cultures focused on generating sources of productivity and competitive differentiation through the active promotion of market winning product(s) and service solutions that provide total customer value and satisfaction (Sila et al., 2016).

1.4 Research Problem

As the concept of supply chain management is complex, as it involves more efforts in producing and delivering final products, any delay in the delivering of the final product to customers will affect the efficiency of supply chain management.

The current economic condition in Egypt have led to an escalating rise of material and processing costs in manufacturing industry. organizations are striving to reduce costs significantly, which calls for functional and managerial supply chain integration.

Based on the previous studies the research problem can be identified as follows: "There is instability of supply chain costs in pharmaceuticals corporations across the last four years and this instability reflects inefficiency of supply chain management in these corporations and its ranking among its competitors"

So that the researcher claims that this instability in supply chain costs can be traced back to poor implementation of total quality management practices that consequently affect the efficiency of supply chain.

It is quite surprising to realize that since the mid-1990s until nowadays, there is still a lot of confusion about the meaning of total quality management(TQM) and the way it is perceived by many senior managers in both industry and commerce.

This study asserts that failure associated with TQM practices implementation is not really the failure of TQM to deliver results but rather the failure of managers to practice TQM effectively.

TQM has to be regarded as a must and should be considered a modern management philosophy to keep spreading the message and change attitudes and behaviors for achieving positive outcomes.

To bridge this research gap, therefore, this study proposes a theoretical model to investigate how TQM practices may affect supply chain efficiency Accordingly, this study attempts to answer the research questions:

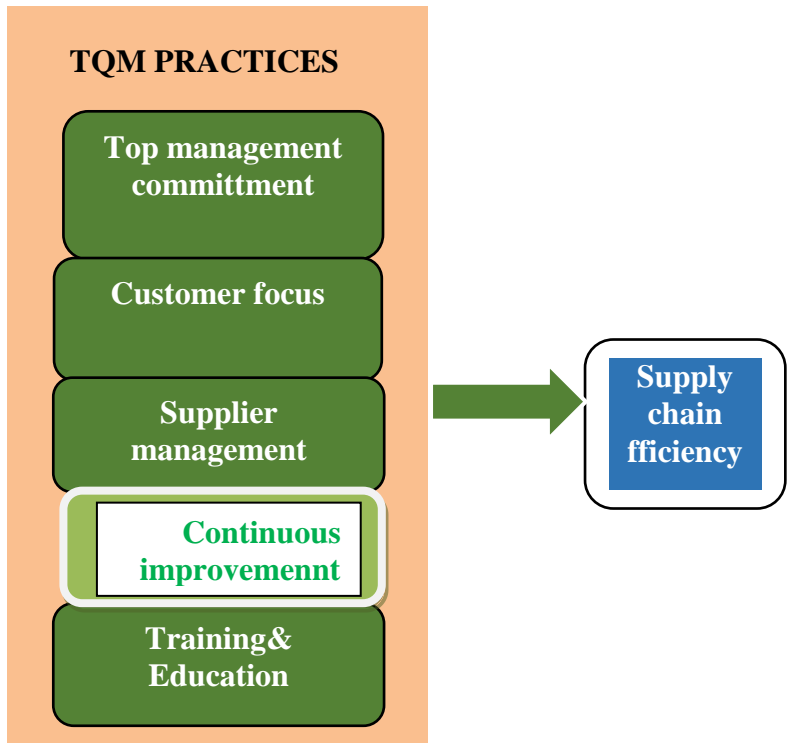
- **RQ1** To what extent the Total Quality Management practices have been applied
- **RQ2** How TQM practices affect supply chain efficiency?
- **RQ3** Which one of the TQM practices have the most impact on Supply chain efficiency ?

1.5 Research Hypothesis

To answer the research questions and achieve the objectives of this research, the following hypothesis is proposed:

- ✚ **H01** There is no significant relationship between TQM practices and Supply chain efficiency..

Figure (2) Research Model



The research aims to contribute to interrelate total quality management practices with supply chain efficiency while the other researches addressing them separately .

1.6 Research methodology

The research population was based on data from the Central Agency for Public Mobilization and Statistics (CAPMAS, 2020) which is the primary source of information on Egypt's economic activities. The sample is selected from the 420 pharmaceutical corporations in Egypt where the majority

belongs to private and multinational ones (95.24%) and (4.76%) was under public sector. the research study was applied to public, private, and multinational pharmaceutical corporations working in Egypt as a manufacturing-based supply chain setting.

The researcher approaches supply chain professionals either supply chain manager, operation manager, general manager, quality manager or quality control manager at these pharmaceuticals corporations.

The sample method to be utilized will be probability sampling. This method will be used to ensure that every member in the population has an equal and independent chance of being selected to be included in the sample.

To collect the quantitative data and test the research hypotheses, a web-based survey was adopted. Of various modes of survey data collection (e.g. postal-mail, telephone, face-to-face survey), this method was chosen for two main reasons: to enable the collection of data in an efficient and cost-effective manner and more importantly, to maximize response rate.

The instrument of collecting data for this study was a questionnaire that distributed on 311 supply chain professionals in 420 pharmaceutical corporations, that consists of three main parts:

Part (I) Multidimensional TQM practices Measure. (Soares et al., 2017), (Zhong, 2016 .(

Part (II) Multidimensional efficiency of SC Measure (Pettersson, 2018), (Negi saurav 2020). **Part (III)** asked for demographic characteristics.

In part II, A five-point Likert-type scale was used to assess the supply chain efficiency of a firm compared to the average in the industry. The Respondents were asked to describe the extent they agree or disagree to each statement that express the level of efficiency the corporation reach. (1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, 5 =strongly disagree).).

Moreover, in **part (III)** the questionnaire captures various descriptive variables that profile the respondents' demographics (i.e. type of corporation, work experience and job title). Responses to each of these demographics are captured using nominal scale with multiple items.

2.1 The Reliability and Validity of the Questionnaire:

Reliability analysis was conducted to investigate the internal consistency of the questionnaire. The internal consistency reliability means the extent to which there is cohesiveness among the questionnaire's items that has been used in the field study Yang and Green (2011). The coefficients of Cronbach Alpha (α) were calculated to measure the internal consistency reliability. According to Yang and Green (2011) the acceptable values of Cronbach Alpha coefficients range from 0.60 to 0.95.

Validity is also required in order to ensure the adequacy of the measurement's instruments. The validity coefficient is equal the square root of alpha Cronbach coefficient, it has to be in the needed limit (equal or more than 60%) Yang and Green (2011).

The Alpha coefficient of total TQM practices, which represents the independent variable is equal 0.953 and the validity coefficient equals 0.945, which also is within the acceptable value. On the other side, the Alpha coefficient of the supply chain efficiency, which represents the dependent variable is equal 0.924 and the validity coefficient equals 0.927, which also is within the acceptable value.

2.2 Descriptive Analysis of the Participants:

In this part the researcher will provide a profile analysis about the participants in the field study which describes their demographic attributes. The following demographic data were collected: job title and work experience in public, private and multinational pharmaceutical corporations.

The following tables summarizes the demographic data of the participants and company profile.

Table (1) "Descriptive statistics for participants & company"

Demographic variables		Frequency	Percentage %
Type of corporation	private	196	63.0
	public	79	25.4
	Multinational	36	11.6

Total		311	100%
Job title	General manager	34	10.9
	Supply chain manager	92	29.6
	Operation manager	74	23.8
	Quality manager	59	19.0
	Quality control manager	52	16.7
Total		311	100%
Years of work experience at the corporation	Less than 5 years	69	22.2
	From 5-10 years	74	23.8
	More than 10 years	168	54.2
	Total	311	100%

Source: statistical results

As we can notice from the previous table that 25.4% of the respondents were in public sector, while 63% were in private and 11.6% in multinational corporations.

From the table we can notice that Supply chain managers represent 29.6% of the total participants of the study and this means that supply managers are the core and have sufficient knowledge about TQM practices and supply chain efficiency. on the other hand operation mangers represent 23.8% while quality managers represent 19.0% of the total participants of the study.

Additionally, the researcher noticed that more than 54.2% of the respondents have more than ten years of work experience in the corporation,

while the fewest percentage (22.2 %) have less than five years of work experience .

2.3 Testing the Study’s Model and Hypothesis

In this part, proposed research hypotheses were tested to figure out the answers to research questions through a series of correlation and regression analysis.

First: the correlation

Table (2)"Correlations between TQM practicesand supply chain efficiency"

	x	x1	x2	x3	x4	x5	y
x	1	.895**	.934**	.935**	.852**	.854**	.916**
x1	.895**	1	.858**	.814**	.654**	.710**	.865**
x2	.934**	.858**	1	.854**	.718**	.755**	.867**
x3	.935**	.814**	.854**	1	.741**	.757**	.855**
x4	.852**	.654**	.718**	.741**	1	.636**	.757**
x5	.854**	.710**	.755**	.757**	.636**	1	.753**
y	.916**	.865**	.867**	.855**	.757**	.753**	1

** . Correlation is significant at the 0.01 level (2tailed).

Source:Statistical results

The previous table shows that there are significant relationships between all the variables of the study and this mean that there is a significant correlation between the dependent variables and independent one as the values reflect positive relations. Thus, it can be concluded that:

- There is a significant relationship between Total Quality Management practices and supply chain efficiency at confidence level 99%.

As a result, the researcher rejects the null hypotheses and accepts the alternative one..

Second: the Regression

Table (3) (Model Summary of regression)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.922 ^a	.850	.847	.36823

a. Predictors: (Constant), TQM practices(x1, x2, x3, x4, x5)

ANOVA^a

Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	234.157	5	46.831	345.384	.000 ^b
Residual	41.356	305	.136		
Total	275.512	310			

a. Dependent Variable: Supply chain Efficiency (y)

b. Predictors: (Constant), TQM practices(x1, x2, x3, x4, x5)

From the above table, it is clear that the total correlation (R) equals (.922), this correlation is strong, and the coefficient of determination (R^2) equals (.850) and this indicates that the independent variables (TQM practices) explain (85.0%) of any change in supply chain efficiency. In addition, the regression model statistically significant when the F test is significant at level of confidence (.99).

Table (4) " coefficient table"

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.294	.087		3.383	.001
	x1	.366	.048	.348	7.656	.000
	x2	.190	.049	.205	3.878	.000
	x3	.167	.042	.197	4.014	.000
	x4	.147	.028	.181	5.290	.000
	x5	.090	.038	.087	2.398	.017

a. Dependent Variable: y

Source: statistical results

The results show that top management commitment has the largest coefficient of correlation of 0.366, followed by both customer focus and

supplier management with coefficients of .190 and .167 , then continuous improvement with .147 and training & education with .090.

Therefore, the regression equation will be as follows:

$$Y = \text{constant} + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5$$

Supply chain efficiency = .294+.366 (top management commitment) +.190 (customer focus)+.167 supplier management+.147 (continuous improvement)+ .090 (training & education.)

-The results show that all of these variables are significantly related to supply chain efficiency as $p\text{-value} < 0.05$, so that we reject the null hypothesis and accept that TQM practices have real impact on supply chain efficiency .

2.4 Hypotheses Tests

Null hypothesis: beta coefficient equal to zero ($\beta = 0$)

The Alternative hypothesis: beta coefficient is not equal to zero ($\beta \neq 0$)

The previous table shows the value of beta for TQM practices that equals (.249) which means that it has a real impact on dependent variable which is supply chain efficiency.

Result: we reject the null hypothesis and accept the alternative hypothesis that there is a significant relationship between TQM practices and supply chain efficiency in pharmaceutical corporations..

3.1 Research conclusions

The understanding of how total quality management practices and supply chain efficiency are correlated in pharmaceutical corporations and the integration between them is very important for effective implementation of TQM practices and very effective in decreasing the supply chain costs that affect the overall performance and efficiency of the corporations and its goodwill among the marketplace.

The impact of implementing TQM practices on supply chain efficiency is very clear in pharmaceutical corporations as it concerned with the quality of products for customers and contain very accurate supply chain to compete in marketplace.

Quality factor in pharmaceutical corporations is the main factor to the success of the corporation through effective management of its supply chain rather than cost factor. On the other hand cost factor can't be ignored.

-Based on the results of statistical analysis, the highest indicator of TQM practices in increasing supply chain efficiency is top management commitment..

-implementing TQM practices is very important in drug design through customer focus and helps in medicine improvement regarding its packaging , labeling, flavor and its shape.

4.1 Limitations and future Scope of the Research

Despite the considerable contributions stated above, it is essential to acknowledge limitations of our research that might provide opportunities for future research.

Firstly, the representativeness of the results based on the data of self-administrated questionnaire and not experimental research designs.

Secondly, This research is investigating TQM practices and supply chains in pharmaceutical industries to make inferences and conclude about manufacturing supply chains. Nevertheless, examining other manufacturing industries can produce slightly or significantly different results.

Thirdly, This research is concerning only with five TQM practices which are(top management commitment. Customer focus, supplier management, continuous improvement and training &education).Based on the literature, other practices could be addressed such as lean management, Six sigmaetc.

Fourthly, The application of this research is on manufacturing pharmaceutical corporations. Distributing and productions corporations could be under investigation.

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Appendix:

Questionnaire

You are being asked to take part in completing a questionnaire that will take approximately about 15 minutes related to a research titled

“the relationship between Total Quality Management Practices and Supply Chain Efficiency in the Pharmaceutical Corporations in Egypt”. The study is being conducted with the approval of the Business Administration Department, Faculty of Commerce, Menoufia University.

We’d be honored if you agree to participate. Your response is very important to the success of this study. Responses will be confidential and used only for this research purpose. The results will be collectively reported without references to a specific person or company.

To sum up this is a short survey about the relationship between the total quality management and its practices and their impact on the supply chain efficiency. In each section of the questionnaire, you will be given specific instructions. Please carefully answer each question.

If you need any further information about the research, please don’t hesitate to contact me at alshimaahany@gmail.com

Many thanks for your assistance and cooperation.

Part (one) Total Quality Management practices(TQM):

please select the answer that clarify your opinion about each statement that represents the extent to which you agree or disagree that these practices (1=strongly agree, 2= agree, 3= neutral, 4= disagree, 5=strongly agree)

TQM practices	1	2	3	4	5
Top management commitment					
- Top management strongly encourages employees involvement in quality management and improvement activities .					
- Top management learns quality-related concepts and skills.					
- Top management actively participates in quality management and improvement process .					
- Top management empowers employees to solve quality problems .					
- Top management empowers suppliers to solve quality problems .					

TQM practices	1	2	3	4	5
Customer focus					
-The company determines the future customer expectations .					
-The company evaluates the formal and informal complaints .					
-The company Follows-up with customers for quality/service feedback					
-The company measures and evaluate the customer satisfaction factors					
-The company interacts with customers to set reliability, responsiveness, and other standards					
-The company Communicates customers' future strategic needs throughout the supply chain.					
-The company uses informal information sharing with customers.					
Supplier management					
-The company regularly conducts supplier quality audit.					
-The company has detailed information about supplier performance.					
-The company always gives feedback on the performance of suppliers' products.					
-The company always participates in supplier activities related to quality.					
-The company has a formal programme for evaluating and recognizing suppliers.					
-The company has very frequent face-to-face planning/communication with key Suppliers.					

Part (Two): supply chain efficiency

Listed below are indicators for supply chain efficiency in an industry. For each of the item below, please circle the number that best describes the extent to which you agree or disagree with the following statements

indicators	Strongly agree	agree	neutral	disagree	Strongly disagree
The product has distinctive features/characteristics when compared to competitors.					
The percentage of defects in our products is acceptable relative to industry competitors.					
The Cost of materials is lower than industry competitors.					
Total cost of materials quality assurance is lower than competitors.					
The Cost of manufacturing is low relative to competitors.					
Overhead cost is low relative to competitors.			v		
The Cost of shipping/ logistics is lower than competitors.					

Part (Three): Demographic characteristics

-Type of ownership:

- Public.
- Private.
- multinational

-Job Title:

- general manager
- supply chain manager.
- operation manager.
- Quality manager.
- Quality control manager.

-years of work experience:

- Less than 5 years
- From 5-10 years
- More than 10 years

