THE ATTITUDES OF THE INDUSTRIAL COMPANIES TOWARDS THE IMPLEMENTATION OF THEORY OF CONSTRAINTS (A FIELD STUDY)

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ABSTRACT

This study aims to recognize the attitudes of industrial companies towards the implementation of the theory of constraints. The null hypotheses tested pertain to the application of theory in order to find how the theory impacts on the performance of industry companies in Jordan. Using primary data collected from a sample of ten companies from three industries, the study finds that there is a statistically significant relationship between the attitudes of the study sample indicating support of industrial companies to the theory of constraints, the availability requirements of the application of the theory of constraints in industrial companies, obstacles of the application of theory of constraints in industrial companies, and the impact of the application of this theory in the performance of industrial companies.

The researchers recommended the importance of integration between modern management accounting techniques and the importance of continuing research and study of the theory of constraints' tools. It also recommends studying the obstacles that hinder the application of both total quality management and theory of constraints in the public or private industrial sector companies.

Keywords: Theory of Constraints, Industrial Companies, Total Quality Management, Attitudes of Industrial Companies, Indirect Costs.

INTRODUCTION

New global economic system has changes in the business environment. It causes complexity of technological development, therefore there needs to develop the information and accounting data to meet the changes. Hence, the need to make substantial changes in cost systems and management accounting to fit those features, and in this sense, researchers have started to search for tools to help develop cost systems and management accounting to conform to the characteristics of the environment of modern manufacturing, modern management methods have emerged as follow the entrance to Continuous improvement (KAIZEN), Activity based Costing, Just In Time, the comprehensive quality Management, and the theory of constraints.

A significant impact on the cost structure in the industry was the low cost of direct employment as a percentage of total costs, increase in indirect costs, increasing the value of investments in order to attract the latest manufacturing systems (Mumena, 2004).

In the context of the evolution of accounting and management science, interest in cost accounting and management accounting has increased in recent years with the Theory of

Accounting constraints and tools as a modern method capable of helping companies and institutions to achieve their objectives of reducing costs and maximizing their profitability as well as it is used as a tool to rationalize administrative decisions.

The Importance

The importance of this research as follows: It supports the process of continuous applying theory of accounting constraints practically. It helps to get benefits of theory achieves in the field of work, such as optimizing resources, minimizing waste and addressing problems that hinder the work of companies in seeking to optimize the use of their available resources. in addition to providing a set of proposals of realistic and practical recommendations based on the results of this research for corporate decision makers, which contribute to strengthening the capacity of the management team of these companies in carrying out their functions of decision-making, planning, management of operational activities and oversight, to achieve the objectives of these companies

The Objective

The objective of this study is to find attitudes of industrial companies towards the implementation of the theory of constraints

The Problem

The study problem with the following question: What are the attitudes of industrial companies that registered in the Jordanian exchange market towards applying the theory of accounting constraints?

LITERATURE REVIEW

There was searchers studied impact of accounting constraints and the environment changes as follow: Mumena (2004) aimed to highlight and diagnose the most important developments in the modern manufacturing environment and its impact on the cost structure. An important outcome of this study: a large proportion of industrial enterprises already apply the accounting input for achievement, in order to achieve many objectives such as increasing the profit margin, continuous development and improvement of performance, rationalization of management decisions and achievement of overall quality for design, production and performance. To achieve these objectives, the field study reflected the existence of many performance measurement and evaluation criteria that are the basis of the accounting approach to achievement, which is of interest to industrial enterprises such as total completion time, machine processing time, production downtime and manufacturing cycle efficiency. Industrial facilities in a modern manufacturing environment give importance to the margin of achievement when deciding to determine the optimum product lineup.

Al-Kashif (2006) aimed to conduct a comparative analytical study of the theory of constraints and marginal input to determine their effectiveness in providing the appropriate information to make the decisions of the production mix that achieve the objectives of the economic unit through the comparative analytical examination of the general framework and foundations of the theory of constraints and marginal input, and the evaluation of this theory from an accounting perspective in order to determine the impact of reliance on each of the effects

of production mix decisions, to determine the effectiveness of the decisions of the combination of production under each of the inputs, and the implications of the introduction of the idea of disproportionate elements of the cost changing on the effectiveness of these decisions. The researcher concluded that the effectiveness of these decisions requires the need to achieve the integration of the theory of constraints and marginal entrance in light of the concept of the imperfect proportion between the cost of energy use and the volume of production.

Gupta & Boyd (2008) aimed to discuss whether the theory of constraints is a general theory in the management of operations, as this study examined the possibility of linking the theory of constraints and basic concepts of operations management, and how to integrate the concepts of operations management and the theory of constraints. This is done by using examples from published studies on the theory of constraints. The study also examined the theory of constraints as a theory possessing the basic characteristics to be a good theory in the management of operations. The study reached the following conclusions: The theory of constraints provides entry points for operational decisions that avoid the risks of local improvement by achieving it in a practical way that serves the organization. The theory of constraints presents a new paradigm in operations management that replaces the main concern of efficiency with the organization's goal as a major concern for operations management. The results confirm that the theory of constraints meets the criteria that make it a good theory of operations management.

Cyplik & Domański (2009) was implemented in the field of pharmaceutical industries, and aimed to demonstrate how the theory of constraints is applied within supply chains, with particular attention to the theory of constraints as a basis of the principles of inventory management. The study provided a practical example of studies aimed at mixed solutions combining the theory of constraints with other methods. The study reached the following conclusions: The application of the theory of constraints in the supply chain management process has the potential to improve its operations under conditions of forecasting low demand. The application of the theory of constraints is also very useful in solving problems associated with locating inventory and the size of the stock in different supply chains.

Kohli & Gupta (2010) aimed to illustrate how small business managers work to develop and maintain competitive advantage by applying the basic principles of the theory of constraints through a case study of a small, family-owned pizza restaurant. This study found that the standards of performance of the constraints' theory encourage small business executives to find renewed ways to increase achievements. The positive results in this study show how small businesses can effectively manage their operations and make profits by using the principles of the theory of constraints.

Al-Ajla (2011) studied industrial companies operating in the Gaza Strip. This study aimed to show the extent of applying throughput accounting in the light of modern developments in the advanced manufacturing environment as a tool to provide appropriate information to assist management in rationalization of decisions and assessing performance in the industrial companies operating in Gaza Strip and to identify the main obstacles to the application and analysis. To achieve the objectives of this study a questionnaire was designed and distributed to the study population that was composed of 60 industrial companies operating in the Gaza Strip and the study findings were the dependency of those companies in applying advanced manufacturing technologies in medium. Most of those companies have the elements of adoption of throughput accounting approach but do not adopt it in spite of their desire to achieve many goals and incentives resulting from this approach such as increasing profit margin, performance

improvement and development, achievement of design, production, and performance quality, and rationalization of administrative decisions. Existence of obstacles and difficulties that impede the application of this approach such as political and economic conditions prevailing in Gaza Strip, also the unwillingness of management to change due to their satisfaction with the offered information of the existing systems and lack of enough support and encouragement to apply this approach. According to the above reflected results, the researcher suggests various recommendations such as: Applying throughput accounting approach for providing information that help in decisions rationalization, performance evaluation, exploring and identifying the major constraints that prevent productivity progress, designing products and improving performance to match the competitive environment.

By reviewing the various previous studies of the subject, the researchers find that this study agrees with previous studies that many companies have found that the theory of constraints may have an important role in maintaining competitive advantage, improving achievements and achieving operational efficiency. While this study differs from previous studies, it will look at many aspects related to the application of the theory of constraints in Jordanian industrial companies.

THE HYPOTHESES

The hypotheses of the study are as follows:

1. There is no statistically significant relationship in the attitudes of the individual study sample towards the response and support of industrial companies to the theory of constraints.
2. There is no statistically significant relationship in the attitudes of the individual study sample towards the availability of requirements for the application of the theory of constraints in industrial companies.
3. There is no statistically significant relationship in the attitudes of the individual study sample towards impediments to the application of the theory of constraints and their tools in industrial companies.
4. There is no statistically significant relationship in the attitudes of the individual study sample towards the effect of applying the theory of constraints and their tools in the performance of industrial companies.

THE METHODOLOGY

In order to achieve the objectives of the research and testily hypotheses, the researchers relied the descriptive analytical approach depending on research previous studies that are relevant to the subject of the study, with the aim of forming the theoretical framework of research and forming the intellectual and theoretical basis on the subject of the study. The researchers will conduct the field study through a questionnaire that will be distributed to a sample of the study community and will test the hypotheses and analyze the results by using Statistical Package for the Social Sciences program (SPSS).

The Conceptual Framework for the Research

Dimensions of the concept of restriction theory

Definition of constraints theory

Many researchers sought to determine the concept and purpose of the doctrine of constraints, but they could not find a common concept of this theory, because of their differing views on how this theory is applied. The theory of constraints has been defined by Goldratt (1988) as a comprehensive theory of management and operation of the organization in the light

of activity constraints. It was also identified by Hilton (2008) as a method that aims to find the most efficient way to remove the greatest problems that hinder the progress of the organization. It was defined by Albright & Lam (2006) as a pull system for managing production flow, the system output is determined by the production rate of the resource that has a comparative, and therefore the production flow chart in the production system as a whole must be carried out through the restricted supplier Zaghloul (2008). Al-Kashif (2006) defines it as a set of concepts and principles aimed at helping the management to identify the difficulties it faces when it seeks to achieve its objectives, and how to overcome them by identifying the necessary changes and how they can be performed efficiently and effectively. Constraints theory is defined by (Motwani et al) as a common technique used for continuous improvement and applied not only to the manufacturing process but also to service operations Ku (2007). It is defined by (CIMA official terminology (2005) as a technique designed primarily to maximize productivity while preserving or reducing inventory and operating costs at the same time.

By reviewing previous definitions of the theory of constraints, this theory can be expressed as a methodology or management philosophy aimed at the effective operation of to achieve maximizing the overall profitability of the facility by making effective use of its resources and continuing to improve its performance through the process of continuous improvement.

The Theory of Constraints was built on the Following Assumptions

The theory of constraints is based on a set of assumptions: Mumena (2004), Bukhari (2002):

1. Maximizing the enterprise's profits.
2. Utilizes the margin of achievement as a measure of funds, where the margin of achievement is expressed in the quantity of sales in the time unit.
3. There are internal or external constraints that reduce the ability of the facility to determine the required level of performance, otherwise the establishment's profit ability is unlimited.
4. Considering the operations of the facility and consuming its various resources as links in the chain that are connected to each other, and its power disappears at its weakest link To solidify the chain as a whole, it requires strengthening and consolidating the weakest link and not strengthening the other links in isolation, so as to ensure the maximum flow of production within the limits of the energy and constraining process possibilities so that the accumulation of stock does not occur.
5. Interlinkages of resources: The theory of constraints considers the facility to consist of a series of successive and interrelated processes, so it focuses on achieving a balanced flow of production through the system to increase the margin of achievement by reducing bottlenecks, which explains the need for production scheduling.

Frame Application Theory of Constraints (Steps)

In 1990, the Goldratt developed a curriculum for applying the doctrine of restriction, called *"Goldratt's continuous improvement plan"*. This plan is composed of Five Focus Steps. These phases manage constraints to improve and increase performance resulting from performance, and these phases can be summarized below Mumena (2004), Al-Kashef (2006), and Rahman (2002):

1. Select System constraints.
2. Report how to exploit a system's constraints.
3. Other factors subject to the previous resolution.
4. Raise (exclude) the system constraints.

5. If the constraint is broken (overcome) in any of the preceding steps, refer to step 1.

Benefits of Using Restriction Theory

Through the foregoing, we find that there are many benefits to the Organization from the application of this theory; the researchers Marton & Paulová (2010) found that applying the theory of constraints might lead to:

1. The likelihood of dramatic productivity increases under some minor changes in operational processes.
2. It is a good tool that promotes teamwork in different areas of work of the organization, which in turn leads to their awareness of the constraints and their need to work together to prepare for the process of removing such constraints.
3. A good process that helps management decides to start optimization efforts and provides immediate and tangible benefits.
4. The capital and productivity cycle will grow without the need for an additional period or additional staff.
5. Provide ways to evaluate the correct values of changes, which helps the organization to choose the best choices that lead to correct behavior and decisions.

Institute of Management accounts IMA (Institute of Management Accountants, 1999**)** believes that applying the theory of constraints leads to: improving the quality of products and services and improving the location of the competition, dramatically increasing profitability. Managing constraints that reduce inventory level and reduce bottlenecks ease in setting up market strategy and taking operational decisions.

Tools for the Theory of Constraints

In 1994, Goldratt published his book, in which he presented a method or a portal based on discovering unfamiliar solutions to the complex problems and difficulties encountered in the practical application of the theory of constraints, ensuring continuous improvement of the organization's activities from production, planning to marketing, through the so-called thinking process Zaghloul (2008). According to Goldratt, the thinking process has been categorized into five logical tools that allow managers to analyze difficult situations, and these tools work to build a system for continuous improvement by creating a diagram for Reason-to-effect (Cause-Effect) that seeks to configure the logical tree Rifai (2008).

According to Hsu &sun, (2005), the logical thinking process is based on the fact that continuous improvement requires the answer to three questions, and each question corresponds to the tool through which that question is answered, and these questions are:

1. Report *"What to change?"* which means defining the essence of the problems, and the tool (tree) that responds to this question is (Current Reality Tree).
2. Report *"What to change to?"* to develop simple and practical solutions to the problem under study, the tools that respond to this question are: Pull-out method (Evaporating cloud), and the tool (tree) that responds to this question is (Future Reality Tree).
3. Report "*How to change?"* which purpose is to apply solutions to the problem under study, and the tools that respond to this question are: (Pre-requisite Tree), and (Transformation Tree).

Below is a brief presentation of each of the previous tools Rifai (2008); Al-Kashif (2006); Panajotova (2008); Dettmer (1997):

1. Current Reality Tree: Use the current reality tree to examine the cause and logical effect between undesired influences in the system, they determine the origin of (Root-Cause) or (Core problem) of most unwanted effects.

2. Evaporating cloud: According to Dettmer (1997), individuals often cannot determine the true causes of the contra line, which are often nested such as clouds, and an evaporating indicates the ability of the tools that Goldratt (1988) devised to dispel the uncertainty surrounding the conflict, leading to a clear definition of its key elements and the means to solve it. Within the evaporation process, the so-called (conflict resolution diagram) resolves the conflict that can perpetuate the causes for unwanted effects. Evaporating cloud is therefore a tool that helps decision makers find solutions to solve this conflict, that is, a tool that searches for conflicts that creates unwanted effects and tries to find solutions that replace these conflicts.
3. Future Reality Tree: This tool is used to promote the proposed solution to the origin of the exposed cause in the current reality tree and to determine the negative effects resulting from the changes for solutions before applying the changes. Where (Injection) is the basis of the selected solution, then the future reality tree tests that entry in terms of its success, or the probability of any negative aftershocks, or is not sufficient to avoid and exclude unwanted effects.
4. Requirement tree: Defines the intermediate targets necessary to implement the solution, as well as identifying the obstacles that must be overcome to implement the solution.
5. Transition tree: Represents a plan for applying changes, and selects the details of the actions to be taken into account to overcome obstacles specified in the requirement tree.

Obstacles to Apply the Theory of Constraints

The theory of constraints faced many criticisms either theoretically or in practical terms, and the researchers found that these criticisms might constitute impediments to the application of this theory, as the study of Zaghloul (2008) indicates that there is a high degree of uncertainty regarding the concepts of constraints theory (achievement, inventory, operating expenses). The theory of constraints used traditional accounting terminology with new unjustified and inconsistently unsure terms (perhaps due to the scientific background of the founder of this theory, Goldratt being a physicist). The thinking tools developed by the theory of constraints lack the validity, credibility and difficulty of learning how to use it by management, as well as relying on a wise interpretation of reality without relying on a specific structural entry.

1. Marton & Paulová (2010) has concluded that the application of the theory of constraints may be difficult in the business environment, especially if constraints are in constant mobility.
2. Cooper & Slagmulder (1999) found that the theory of constraints would provide us more optimization to maximize profitability in the short term in case of operating under a production environment with bottlenecks. As to the persistence of short-term operating expenses on the assumption of Goldratt, this assumption is incorrect (Mumena, 2004).

The Working Framework of the Search

Data collection stage

At this stage, the researchers will rely on the questionnaire list to gather information that will help achieve the search objectives, and the questionnaire list has been divided into two sections (see index No. 1) as follows:

Section I

A letter from the researchers to the sample members of the study showing the objectives and scope of the study, and data relating to general information on the companies mentioned in the sample research, as well as special information concerning the sample members.

Section II

Includes questionnaire axes for measuring study variables, involving the following:

1. Knowledge of the views of industrial companies towards the application of the theory of constraints and their tools in terms of identifying the efforts of response and support of companies to this theory. The extent of the requirements that companies need to apply this theory, identifying the obstacles that may impede the process of application, and the impact of the application of this theory and its tools in corporate performance.
2. Testing the study hypothesis. With regard to the measurement of study variables, a measure (Likert) has been used to convert descriptive concepts contained in questionnaire list questions to quantitative values that are easy to be subject to statistical analysis and study assignments.

The arithmetic averages for the purposes of the study were also determined as follows: (4.25-5) A very high score, (3.50-4.24) indicating a high score, (2.75-3.49) indicating a moderate degree, (2-2.74) indicating a low degree, (less than 2) indicating a very low degree.

Sample

The study sample was selected for a group of industrial companies listed in Amman Stock Exchange (4 pharmaceutical companies, 5 food industry companies, 1 Chemical industry companies). The lists of the questionnaires were distributed to each of the (Executive Director, Director of production, director Financial and cost accounting for each company. The lists distributed were (73) and a valid list of studies has been compiled (46), which has undergone statistical analysis.

Statistical Analysis Method Used

The researchers relied on the statistical program (SPSS) in analyzing the data collected in the questionnaire lists to achieve the objectives of the research, including the following:

1. Cronbach-alpha test to judge the credibility of the questionnaire list and its contents, for the purposes of judging the homogeneity of the items used to measure variables.
2. Repetitions and percentages to describe the characteristics of the study personnel.
3. Arithmetic averages and standard deviations to determine the answers of the study personnel to the questions contained in the topics of the study.
4. T-Test to judge the extent to which research hypotheses can be accepted or rejected by comparing (T) calculated with the level of significant (0.05), bearing in mind that the number of sample vocabulary has not exceeded (46) single.
5. Correlations' test to determine the correlation between the study variables and their reciprocal effects.

Results Distribution

Cronbach-alpha test Result

This test is concerned with determining the credibility of the questionnaire list and its contents, and according to this test the closer the value (alpha) to the number one, it shows the homogeneity and therefore credibility, and conversely, the closer the value (alpha) to zero, it indicates no homogeneity and therefore lack of credibility, and from the reality of the outputs of the SPSS program, the value of alpha test appears in Tables 1 & 2.

Table 1 TEST RESULT CRONBACH-ALPHA COEFFICIENT	
Alpha	**No of Items**
0.916	29

An alpha value (91.6%) appears it demonstrates homogeneity and increased credibility.

Table 2 DISTRIBUTION OF THE SAMPLE PROPERTY	
Property	**Distribution Property**
Gender	Male (80.4%), Female (19.6%)
Qualification	Less than a public secondary school (2.2%), university degree (82.6%), higher education (15.2%)
Number of employees in the company	50 employees and below (15.2%), from 50 employees to 300 employees (60.9%), more than 300 employees (23.9%)
Number of years of the company's work	3 years and below (0%), from 3 to 6 years (21.7%), over 6 years (78.3%)

First Test

Assesses the responsiveness and support of industrial companies to the theory of constraints, and the variables affecting the hypothesis consist of: X1, X2, X3, X4, X5, X6, X7 presented in Table 3.

Table 3 t-TEST RESULTS OF REGRESSION ANALYSIS VARIABLES ASSOCIATED WITH THE FIRST HYPOTHESIS					
Variable symbol	**Mean**	**Std. Deviation**	**T value**	**Degree of freedom**	**(Sig)**
X1	4.54	0.585	17.887	45	0.00
X2	4.41	0.58	16.516	45	0.00
X3	4.24	0.736	11.42	45	0.00
X4	4.39	0.614	15.372	45	0.00
X5	3.89	0.526	11.49	45	0.00
X6	4.3	0.813	10.882	45	0.00
X7	4.11	0.875	8.593	45	0.00
General average	4.269	0.676	13.166	45	0.000

Note that the general arithmetic mean of the first hypothesis was (4.269) of five points indicating that the response and support of the industrial companies to the theory of constraints was very high. The results of the T test described above show that the null hypothesis must be rejected and the alternative hypothesis must be accepted. The variables of the study show a significant level, less than (0.05), thus, the alternative hypothesis is accepted: There is a statistically significant relationship in the attitudes of the sample members towards the response and support of the industrial companies to the theory of constraints.

Test correlation coefficients between the study variables associated with the first hypothesis: The results of the previous Table 4 show the strength and direction of correlation coefficients between variables, indicating that the correlation between variables is positive, as well as showing that the strength of correlation coefficients between variables is moderate at significant level (0.05) and significant level (0.01).

Table 4
RESULTS OF CORRELATION ANALYSIS BETWEEN SOME VARIABLES ASSOCIATED WITH THE FIRST HYPOTHESIS

Variables	X2	X3	X4	X6	X7
X2	1	0.336(*)	0.659(*)		
X3	0.336(*)	1		0.656(**)	0.649(**)
X4	0.659(**)		1		
X6		0.656(**)		1	0.515(**)
X7		0.649(**)		0.515(**)	1

* Link at significant level (0.05).
** Link at significant level (0.01).

Second hypothesis test: the availability of requirements for the application of the theory of constraints in industrial companies. The variables affecting the hypothesis consist of: X8, X9, X10, X11, X12, X13, and X14 presented in Table 5.

Table 5
t-TEST RESULTS OF REGRESSION ANALYSIS VARIABLES ASSOCIATED WITH THE SECOND HYPOTHESIS

Variable symbol	Mean	Std. Deviation	T value	Degree of freedom	(Sig)
X8	4.2	0.778	10.423	45	0
X9	3.52	1.027	3.445	45	0.001
X10	3.87	0.98	6.018	45	0
X11	4.09	0.694	10.628	45	0
X12	3.59	0.777	5.125	45	0
X13	4.2	0.719	11.284	45	0
X14	3.85	0.698	8.236	45	0
General average	3.903	0.810	7.880	45	0.000

Note that the general arithmetic average of the second hypothesis (3.903) of five points. This indicates the availability of the requirements for the application of the theory of constraints in industrial companies to a high degree, and the results of the test (T) described above indicate that the null hypothesis must be rejected and the alternative hypothesis must be accepted. The variables of the study show a significant level less than (0.05), thus, the alternative hypothesis is accepted: there is a statistically significant relationship in the attitudes of the individual study sample towards the availability of requirements for the application of the theory of constraints in industrial companies.

Test correlation coefficients between the study variables associated with the second enforcement:

Table 6
RESULTS OF CORRELATION ANALYSIS BETWEEN SOME VARIABLES ASSOCIATED WITH THE SECOND HYPOTHESIS

Variables	X8	X9	X10	X11	X12	X13	X14
X8	1	0.426(**)	0.413(**)				
X9	0.426(**)	1			0.304(*)		
X10	0.413(**)		1			0.321(*)	
X11				1	0.398(**)		
X12		0.304(*)		0.398(**)	1	0.506(**)	0.291(*)
X13			0.321(*)		0.506(**)	1	
X14					0.291(*)		1

The results through the Table 6 show the strength and direction of correlation coefficients between variables, indicating that the correlation between variables is positive, as well as the strength of correlation coefficients between variables are moderate at significance level (0.05) and significance level (0.01).

Third hypothesis test: impediments to the application of the theory of constraints and their tools in industrial companies, the variables affecting the hypothesis consist of: X15, X16, X17, X18, X19, X20 represented in Table 7.

Table 7
t-TEST RESULTS OF REGRESSION ANALYSIS VARIABLES ASSOCIATED WITH THE THIRD HYPOTHESIS

Variable symbol	Mean	Std. Deviation	T value	Degree of freedom	(Sig)
X15	4.46	0.585	16.8799	45	0.00
X16	3.63	1.019	4.196	45	0.00
X17	4.26	0.648	13.206	45	0.00
X18	4.33	0.762	11.808	45	0.00
X19	4.3	0.726	12.18	45	0.00
X20	4.15	0.868	8.999	45	0.00
General average	4.188	0.768	11.211	45	0.00

Note that the general arithmetic average of the third hypothesis (4.188) of five points, This indicates that there are impediments to the application of the theory of constraints and its tools in industrial companies to a high degree, and the results of the test (T) described above indicate show that the null hypothesis must be rejected and the alternative hypothesis must be accepted. The variables of the study show a significant level less than (0.05). Thus, the alternative hypothesis is accepted: there is a statistically significant relationship in the attitudes of the individual study sample towards impediments to the application of the theory of constraints and their tools in industrial companies.

Test correlation coefficients between the study variables associated with the third hypothesis:

Table 8
RESULTS OF CORRELATION ANALYSIS BETWEEN SOME VARIABLES ASSOCIATED WITH THE THIRD HYPOTHESIS

Variables	X15	X17	X18	X19	X20
X15	1	0.382(**)	0.656(**)	0.345(*)	
X17	0.382(**)	1	0.635(**)	0.347(*)	0.363(*)
X18	0.656(**)	0.635(**)	1	0.499(**)	0.326(*)
X19	0.345(*)	0.247(*)	0.499(**)	1	
X20		0.363(*)	0.326(*)	0.383(**)	1

The results through the Table 8 show the strength and direction of correlation coefficients between variables, indicating that the correlation between variables is positive, as well as the strength of correlation coefficients between variables are moderate at significance level (0.05) and significance level (0.01).

Test the fourth hypothesis: determining the effect of applying the theory of constraints and its tools in the performance of industrial companies. The variables affecting the hypothesis consist of: X21, X22, X23, X24, X25, X26, X27 X28, and X29 are presented in Table 9.

Table 9
TEST RESULTS (t-TEST) FOR REGRESSION ANALYSIS VARIABLES ASSOCIATED WITH THE FOURTH HYPOTHESIS

Variable symbol	Mean	Std. Deviation	T value	Degree of freedom	(Sig)
X21	3.78	0.696	7.622	45	0
X22	3.15	0.788	1.31	45	0.197
X23	3.37	0.741	3.382	45	0.001
X24	3.8	0.778	7.012	45	0
X25	3.91	0.755	8.202	45	0
X26	3.48	0.691	4.695	45	0
X27	3.96	0.631	10.282	45	0
X28	4.28	0.688	12.636	45	0
X29	4.15	0.868	8.999	45	0
General average	3.764	0.737	7.127	45	0.022

Note that the general arithmetic average of the fourth hypothesis (3.764) of five points, This indicates the effect of applying the theory of constraints and its tools in the performance of industrial companies to a high degree, and the results of the test (T) described above indicate show that the null hypothesis must be rejected and the alternative hypothesis must be accepted. The variables of the study show a significance level less than (0.05), except for the variable (X22). It needs further clarification to answer it, and therefore the alternative hypothesis is accepted: there is a statistically significant relationship in the attitudes of the study's sample towards the effect of applying the theory of constraints and its tools in the performance of industrial companies.

Test correlation coefficients between the study variables associated with the fourth hypothesis:

Table 10
RESULTS OF CORRELATION ANALYSIS BETWEEN SOME VARIABLES ASSOCIATED WITH THE FOURTH HYPOTHESIS

Variables	X21	X22	X23	X24	X25	X26	X27	X28	X29
X21	1	0.305(*)	0.374(*)	0.740(**)	0.555(**)	0.359(*)	0.484(**)	0.316(*)	
X22	0.305(*)	1	0.434(**)	0.376(*)	0.359(*)				0.323(*)
X23	0.374(*)	0.434(**)	1	0.552(**)	0.496(**)	0.472(**)	0.415(**)	0.313(*)	0.463(**)
X24	0.740(**)	0.376(*)	0.552(**)	1	0.576(**)		0.571(**)		0.374(*)
X25	0.555(**)	0.359(*)	0.496(**)	0.576(**)	1	0.422(**)	0.505(**)	0.476(**)	0.326(*)
X26	0.359(*)		0.472(**)		0.422(**)	1	0.304(*)	0.364(*)	
X27	0.484(**)		0.415(**)	0.571(**)	0.505(**)	0.304(*)	1		0.418(**)
X28	0.316(*)		0.313(*)		0.476(**)	0.364(*)		1	0.447(**)
X29		0.323(*)	0.463(**)	0.374(*)	0.326(*)		0.418(**)	0.447(**)	1

The results through the Table 10 show the strength and direction of correlation coefficients between variables, indicating that the correlation between variables is positive, as well as the strength of correlation coefficients between variables are moderate at significance level (0.05) and significance level. (0.01)

CONCLUSIONS

The theory of constraints is an effective tool for short-term cost management and is very suitable for decision-making in that period. The theory of constraints is widely used in industrial

organization, as well as used effectively to improve performance in areas outside industrial matters such as: market, management. The field study reflected the result which is a statistically significant relationship in the trends of the sample of the study towards the response and support of industrial companies to the theory of constraints, the availability of requirements for the application of the theory of constraints in industrial companies, obstacles to the application of the theory of constraints and tools in industrial companies, impact Application of the theory of constraints and their tools in the performance of industrial companies.

RECOMMENDATIONS

Through the results of the study, the researcher proposes the following recommendations: The importance of research in the integration of modern management accounting techniques to provide production requirement, planning and design of products, and reduce costs, in order to achieve strategic performance of cost and excellence. The need to continue researching and studying the tools that are concerned with the theory of constraints, as well as the study of the environment covered by this theory, in order to know the truth of this theory and the obstacles to its application. Study of obstacles to the application of the theory of constraints in public or private industrial enterprises.

REFERENCES

Al-Ajla, A.A.A. (2011). Extent of the applicability of the accounting approach to achievement in light of developments in the modern manufacturing environment: A field study on industrial companies in the Gaza Strip.

Albright, T., & Lam, M. (2006). Managerial accounting and continuous improvement initiatives: A retrospective and framework. *Journal of Managerial Issues*, 157-174.

Al-Kashif, M.Y. (2006). *Comparative Study of the theory of constraints and the method of marginal analysis to make decisions for optimum blending of products.*

Bukhari, N. (2002). Development of an activity-based costing approach to rationalize performance in the short term, Unpublished master thesis, King Abdul-Aziz University, Saudi Arabia.

CIMA official terminology. (2005). Theory of constraints and through put accounting.

Cooper, R., & Slagmulder, R. (1999). Integrating activity-based costing and the theory of constraints. *Management Accounting (USA), 80*(8), 20-22.

Cyplik, P., & Domański, R. (2009). Implementation of the theory of constraints in the area of stock management within the supply chain-a case study. *LogForum, 5*(3), 1-12.

Dettmer, H.W. (1997). *Goldratt's theory of constraints*. Milwaukee, WI: ASQ Quality Press.

Goldratt, E.M. (1988). Computerized shop floor scheduling. *The International Journal of Production Research, 26*(3), 443-455.

Gupta, M.C., & Boyd, L.H. (2008). Theory of constraints: a theory for operations management. *International Journal of Operations & Production Management*.

Institute of Management Accountants: IMA. (1999). *Theory of constraints (TOC) management system fundamentals*, United States of America.

Kohli, A.S., & Gupta, M. (2010). Improving operations strategy: Application of TOC principles in a small business. *Journal of Business & Economics Research (JBER), 8*(4).

Ku, E.K.C. (2007). An investigation of theory of constraints (TOC) and related techniques in health care operations.

Marton, M., & Paulová, I. (2010). Applying the theory of constraints in the course of process improvement. *Research Papers Faculty of Materials Science and Technology Slovak University of Technology, 18*(29), 71-76.

Mumena, H.M. (2004). The effectiveness of accounting for achievement through the modern manufacturing environment: A field study on industrial companies in Jeddah. Unpublished master thesis, King Abdul-Aziz University.

Panajotova, T. (2008). Theory of constrains applying in optimization of production management systems and automation of production systems.

Rahman, S.U. (2002). The theory of constraints' thinking process approach to developing strategies in supply chains. *International Journal of Physical Distribution & Logistics Management*.

Rifai, M. (2008). The effect of applying the theory of constraints on flow rates.

Zaghloul, J. (2008). A critical perspective of the theory of constraint sand its implications from management accounting.