The Impact of Reverse Logistic Management Practices on Corporate Performance Levels: An Empirical Study for the Egyptian Chemical Sector During Covid Pandemic[1]

Dr. Injy Hassan Nashaat

Assistant Professor of Management

Injy.nashaat@miuegypt.edu.eg

Dr. Hala El Sedafy Bakry

Doctoral of Business Administration

hala.bus0366@miuegypt.edu.eg

Faculty of Business Administration and International Trade; Management Department

Misr International University

ABSTRACT

This paper aims to test if there was an impact of reverse logistic dimensions over economical organizational performance levels in the Egyptian chemical sector. We viewed three reverse logistic theories; one concerned with organizational resources; the other with its economies and the third regarding hierarchy (Vlachos, 2016). The study examined three main independent variables: coordination/integration, information technology and incentives. All of them measured economical organizational performance from its perspective.

This is a field study performed over the Egyptian Chemical Sector. Data was collected from 10 companies located in 4 provinces Cairo, Giza, Alexanderia and Qalubiya. The Survey targeted managers and it was composed six sections. Sample under investigation was 214 managers only 162 responses were valid. The survey adopted a 5 interval likert scale form.

The results showed that there is an impact between reverse logistic variables and organizational performance. Thus, the study failed to accept all three categorical null hypotheses. All statistical measurements used in the study were conducted using SPSS 27. Anova and Chi square tests were used to test the relationships between dependent and independents. This study is multiple cross-sectional study of one survey and stratified sample statistical technique.

This study has been performed under unprecedented circumstances of covid lock down. Logistic analysis was limited only to the practices just before and during local quarantine measurements. Also, there were two reverse logistic dimensions not included in this study as well.

---

[1]Received in 18/11/2021, accepeted in 21/1/2022.

The study aimed to improve the strategy of logistic management measures in the Egyptian Chemical sector and study its conformance with global results.

This study has been conducted under covid pandemic circumstances. A considerably large number of managers were contacted and the population was large. Egyptian chemical sector is rather an important sector yet not rely investigated specially regarding logistic management measurements.

Keywords: *Reverse logistics, Supply chain, Performance management, Business Strategy, Egyptian Chemical sector.*

1. INTRODUCTION

Humanity has faced a great challenge in 2020. Covid- 19 hit hard all sectors of industry leaving a mark that is hard to change. Managerial practices have changed, looking at the office work is not the same, travel restrictions are here to stay, therefore the way we do business is not the same.

There is no wonder that the chemical industry has been hit by the global halt of travel which led to a severe shortage in raw materials as countries closed its boarders. Thus, what we mean by changing the way we do business is adjusting the logistics in supply chain practices of the sector.

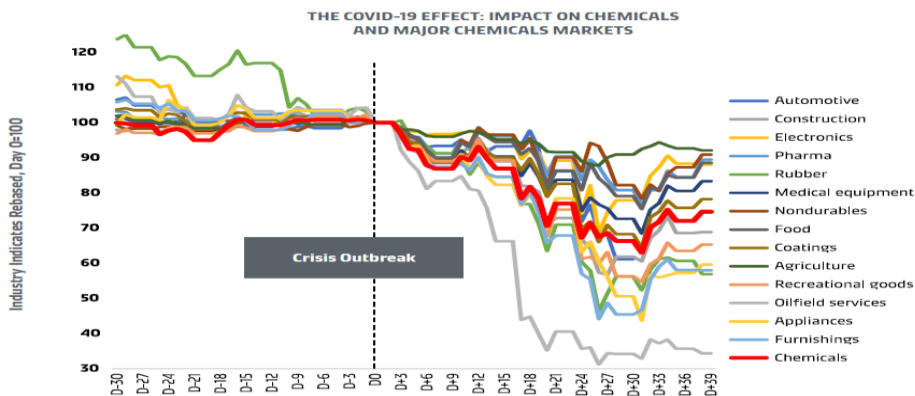The figure below illustrates the severeness of the damage that happened to the sector after lock down.

Figure 1: Covid Impact on Chemical Market

Source:https://www.weforum.org/agenda/2020/09/chemical-and-materials-industry-impact-stimulus-packages/, n.d.)

Therefore, in order to create and sustain a competitive advantage for a business you need flexible logistical practices and innovation willingness to differentiate

yourself from any rivals. This continuous improvement causes an adaptation to the rapid change that supply chain faces in modern business environment.

(Francis & Waiganjo, 2014) Argued that in order to achieve organizational competitiveness, companies need to enhance the way they operate by smoothing the flow of materials through out the supply chain stream.

In this paper we will be targeting how logistics is impacting performance levels in chemical industries in Egypt in order to get the best practices out of it and to further avoid any crisis in the future.

2. LITERATURE REVIEW

"Logistics encompasses all of the information and material flows throughout an organization. It includes everything from the movement of a product or from a service that needs to be rendered, through to the management of incoming raw materials, production, the storing of finished goods, its delivery to the customer and after-sales service" (Gunasekaran, 2003)

Thus, in order to achieve customer satisfaction, the complex system of supply chain needs to be continuously improved by management and reinforced to achieve high performance levels.

However, we need to manage this logistics. According to (Springinklee, 2012) logistics management is the process of integrating the supply chain management processes including information, capital and raw material from source to customer.

From here we can say that logistics management is a strong strategic tool to achieve competitive advantage (Kenyon, 2007)

Therefore, the findings of (Mentzer, 2004) argued that strategically logistic management in the process of developing the right product at the right time with the right quality to the ultimate customer in order to sustain competitive advantage.

According to (Karimi, 2014) both organizational competitive advantage and corporate performance are affected by supply chain management practices.

For this (Natasha RISTOVSKA, 2017) stated that, logistic managers should pay attention to coordination and integration regarding records of procurement,

product stocks, time needed between material purchase to product delivery. They also pinpointed that warehouse locations should be well chosen and maintain low product stocks in order to endure smaller inventory cost. They also concluded:

- Attention to stock control, effective storage, proper transportation, handling information, and organized integration and coordination of business activities lead to a reduction in operating cost.
- Keeping electronic records and timing delivery reduced transportation costs and helped in correctly predicting the amount of reduction in future transportation costs.
- Proper handling and dealing with logistic management tools improved companies' performance.

Then the work of (Fugate, 2010) agrees with the previous work as they found out that managing the logistic of an organization is found to be successful when, incorporating efficiency, effectiveness and differentiation of the whole process.

Therefore, (Mamad, 2013) concluded that in order to measure the supply chain management; managers need to procrastinate, the effect of, price per cost, quality of products, marketing duration and innovation process.

However, each company needs to develop its own logistic value system in order to benefit from the industry and its working environment.

According to (Bourlakis, 2014) in order to achieve organizational sustainability societal and ecological drivers need to be addressed therefore effective reverse logistics will be achieved.

Which leads to the results of (Vlachos, 2016) where he identified six dimensions of logistic management that will impact organizational performance; which are:

- Logistic information management did not have an influence over organizational performance.
- Close-loop capability influenced organizational performance positively through improving cost and customer satisfaction.
- Supply chain coordination and integration affected organizational performance positively by creating value to organizations.
- Institutional incentives impact organizational performance positively by improving organizational environment. Also, it had the highest impact on cost.

- Conformity capability improved organizational performance by reducing costs and increasing competitiveness.

Also, the work of (Kenneth &Green, 2008) argued that there is a relationship between coordination and integration in improving organizational performance. Thus, logistic management improves organizational performance.

In this paper we are going to examine the gap in literature regarding the following independents:

2.1 Supply chain coor dination and integration in transportation and storage

Previous literature discussed the impact of proper storage and effective transportation (Natasha RISTOVSKA, 2017) and (Fugate, 2010). However, the interaction between transportation and storage effective coordination and integration is still green especially when dealing with the Egyptian market. Also, in this context the performance measure is going to focus on the efficiency of direct and indirect distribution.

2.2 Logistic of information technology

This factor has been tackled before in a way that measures the degree of impact on financial performance (Vlachos, 2016) . Thus, the gap of literature that we are going to tackle in this paper is how applying data entry and technology in progressing corporate performance regarding the efficiency in distribution channels and not financial performance.

2.3 Organizational incentives

This factor in particular is rather innovative as it is directly related to covid circumstances. The emotional reward that employees receive when facing unprecedented circumstances. This factor has been tackled in previous research by (Bourlakis, 2014) and (Vlachos, 2016). However, this paper is going to target the impact of quick managerial response in protecting their knowledge employees even before lock down was mandatory. Therefore; utilizing knowledge management as an incentive tool. Also, the performance measure used is financial and interpreted using efficiency of distribution cost.

- We can say also, that there has been a gap in the method used in measuring the corporate performance levels which has usually used only total financial

outcome as a measure. The power of this paper is in allocating different financial performance measures for each factor category to understand which contributes to the overall financial performance.

- The main aim of the following measures and data is to put the right supply chain strategy and modify by category.

3. METHODOLOGY

3.1 AIM OF THE STUDY

According to the most recent publish of Capmas, trade balance deficit in Egypt dating 11/7/2021 declined by 13.3% due to a massive increase in exporting. The highest percentage of exports was in the chemical and pharmaceutical sector with a 77% increase. This gives us an indication that this sector is highly important in the increase in Egyptian GDP. We have to acknowledge that this increase happened during a pandemic where boarders were closed and global trade was halted. The fact that this sector flourished regardless of all odds is that it had a unique logistic management system that provided stability to the sector. In this paper we are going to address some factors that helped in anchoring a sector through ongoing unprecedented circumstances. These factors are all related to supply chain handling and reverse logistics.

3.2 RESEARCH QUESTIONS AND HYPOTHESIS

3.2.1 THIS PAPER ATTEMPTS TO ANSWER THE FOLLOWING QUESTIONS:

Q_0: Is there a significant relation between reverse logistic management dimensions and organizational performance?

Q_1: To what extent does supply chain coordination and integration impacts organizational performance in Egyptian chemical sector?

Q_2: To what extent does logistic information management impacts organizational performance in Egyptian chemical sector?

Q_3: To what extent does Organizational Incentives impacts organizational performance in Egyptian chemical sector?

3.2.2 THE FOLLOWING ARE THE PROPOSED HYPOTHESES

H_0: There is no significant impact between reverse logistic management dimensions and organizational performance.

- **Research Model**

(Cross Sectional Linear Regression for main effects with interaction on organizational performance) Organizational Performance = b_0+ b_1(coordination of transportation) +b_2(integration of transportation)+b_3 (coordination of storage)+b_4 (integration of storage) +b_5 (logistic technology)+b_6 (knowledge management) + b_1(coordination of transportation)*b_2(integration of transportation)*b_3 (coordination of storage)*b_4 (integration of storage) *b_5(logistic technology) *b_6(knowledge management) +e_i, where b=0

H_{01}: There is no significant impact between supply chain coordination/ integration and organizational performance in the Egyptian chemical sector.

This is in terms of coordination and integration between transportation and storage and performance will be measured using efficiency of direct and indirect distribution.

- **Research Model**

(Cross Sectional Linear Regression for main effects with interaction on organizational performance) Organizational Performance (direct and indirect distribution) = b_0+ b_1(coordination of transportation) +b_2 (integration of transportation) +b_3 (coordination of storage) +b_4 (integration of storage) +b_5(logistic technology) +b_6(knowledge management) + b_1(coordination of transportation) *b_2 (integration of transportation) *b_3 (coordination of storage) *b_4 (integration of storage) +e_i, where b=0

H_{02}: Logistic Information Technology does not mediate the relationship between knowledge management and coordination and organizational performance in Egyptian chemical sector.

This is in terms of logistic information technology and performance will be measured using economics of distribution channels.

- **Research Model**

(Cross Sectional Linear Regression for main effects with no interaction on organizational performance) Organizational Performance (Economics of distribution channels) = b_0+ b_5(logistic technology) +e_i, where b=0

H$_{03}$: There is no significant impact between applying organizational incentives and organizational performance in Egyptian chemical sector.

This is in terms of effective logistic knowledge management and performance will be measured using efficiency of distribution cost.

- Research Model

(Cross Sectional Linear Regression for main effects with no interaction on organizational performance) Organizational Performance (efficiency of distribution cost) = b$_0$+ b$_5$(Knowledge management) +e$_i$, where b=0
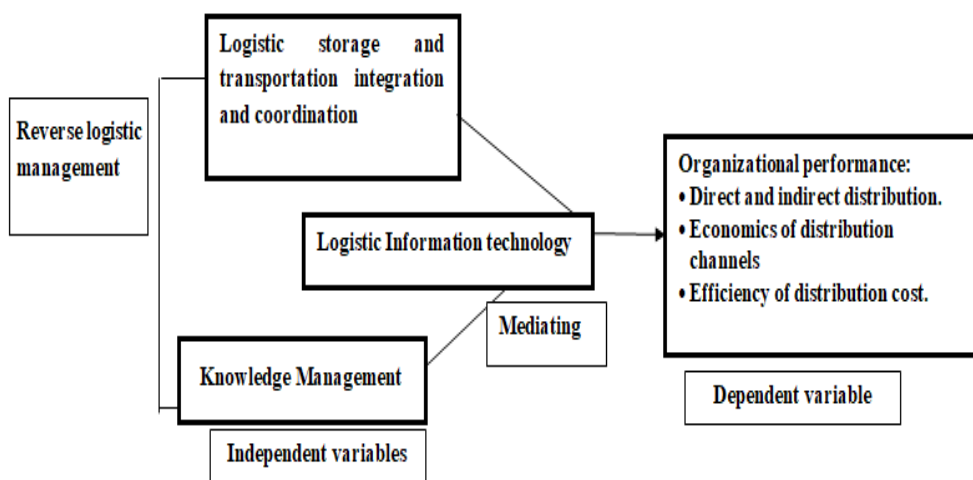

Figure 2: Conceptual Frame work

Source: author.

It has been seen in the chemical industry that logistics is a very important aspect to achieve high performance levels and thus sustaining market share and competitiveness. For the purpose of this study; an observational type research for the chemical market in Egypt during unprecedented circumstances and discovered that; business owners did not only use logistic management to achieve good performance rates but, also, they relied on reverse logistics to combat the consequences of covid in a turbulent business environment.

Thus, it came to our knowledge that; there has been three major reverse logistic variables highly involved in industry. This concept is depending mainly on the finding of (Vlachos, 2016) which discusses reverse logistic model. Those independent variables are:

3.2.2.1 LOGISTIC COORDINATION/INTEGRATION

as per taking into consideration the typology of the chemical industry in Egypt. Coordination and Integration has been viewed from the transportation and storage perspective; thus, performance rate will be measured using direct and indirect distribution channels.

3.2.2.2 LOGISTIC INFORMATION MANAGEMENT

this aspect is a new one in Egypt and consequently its usage has been viewed from the perspective of the frequency of relying on information technology in data entry and data usage; perceptively; performance rates has been measured using economics of distribution channels.

3.2.2.3 ORGANIZATIONAL INCENTIVES

this variable arose many questions in the researcher mind due to unusual circumstances that they were operating in. The unusual way business owners used incentive supposedly had a pay off into reducing cost. Organizational incentive was the usage of remote work force even before covid lock down which led to effective use of logistic knowledge management and to detect its pay back on performance we will use efficiency of distribution cost. This variable has been utilized as knowledge management because of the quick response to the unprecedented circumstance of covid and treating employees as knowledge bank to the organization.

To achieve the purpose of this study, a multiple cross-sectional descriptive research design has been used.

4. RESEARCH DESIGN

4.1 Setting

The study relied on 10 chemical companies in Egypt distributed among four main provinces Cairo, Giza, Alexandria and Qalyubiyah. Unite of investigation was mangers and staff and the total population among them was 14,410 employees. The study is considered to be non-contrived and the researcher did not use any experimental settings. All applicants were contacted for the purpose of the study. To ensure discretion of information all the data of the sample has been collected and encrypted anonymously to ensure the privacy of employees and discretion of the process.

4.2 Sampling

The study has been conducted using a stratified random sampling technique to ensure appropriate coverage of all managerial and staff levels. The managers' population was 484 managers and 13926 staff from all 10 companies under investigation (see Figure:3). Then a stratified random sample has been performed using proportional distribution (see Figure:4). Only managers will be included in this research.

Table 1: Community and Sample

Statement / Categories	No.	Sample / comprehensive inventory	Sample volume	No. of correct responses	Percentage of responses
Managers	484	Stratified random sample	214	162	75.7%
Staff	13926				

Source: Author

Table 2: Distribution of Sample Size of Mangers and Staff using Proportional Distribution.

S	Company's name	Managers	
		Community of managers	Proportional distribution
1	KIMICA International Company for chemicals and detergents	47	21
2	Global company for trading chemicals and factory supplies	49	22
3	United Sulfur and Chemicals Company.	42	18
4	Egyptian Company for Chemical and Electromechanical Industries	49	21
5	National Chemicals and Development Company	44	20
6	SIAG Chemicals Company	53	23
7	UNION Company for paints and chemical industries.	45	30
8	MARJAN Chemical Industries Company	44	20
9	HI Chemical Marking Company	52	23
10	Chemical Partners Egypt Company.	59	26
	Total	484	214

Source: Author.

5. TOOLS OF DATA COLLECTION

Due to the complexity of the distribution process the survey has been handled electronically to avoid human contact. The survey is composed of six sections. Every two related sections were tied in cross analysis. The survey used a 5 interval likert style statements (see Figure:5). The data had been analyzed statistically using SPSS 27. This study is a multiple cross sectional analysis where one survey has been used over a stratified sample technique.

Table 3: Interval annotations and their approvals

Likert quintet	Degree	Term	Relative importance	Investigation level
completely disapproval	1	1-1.80	20% to 36%	Quite low
Disapproval	2	18.1-2.60	36.2% to 52%	Low
Somewhat approval	3	2.61-3.40	52.2% to 68%	Average
Approval	4	4.20-3.41	68.2% to 84%	High
Completely approval	5	4.21-5	84.2% to 100%	Quite high

6. RESULTS AND DISCUSSIONS

In her analysis of the data, the researcher relied on the following: The arithmetic mean and standard deviation to characterize the study variables through the data collected, as well as relying on the Cron Bach's Alpha coefficient, It is used to measure the validity and reliability of the questions in the reliability factor this is to measure the stability of the study tool by the square root method of the alpha coefficient in addition to the correlation coefficients to calculate the internal consistency of the survey axes.

6.1 Inferential statistics and statistical tests:

Researcher relied on analyzing the study data through inferential statistics to investigate the validity of the hypotheses, and these methods are as **follows:**

6.1.1 Simple Linear Regression

Analysis: It is a statistical method used to test the effect of one independent variable on one dependent variable by the OLS method, which includes the regression coefficients test (t), the overall model test (F), and some least square assumptions validation tests.

6.1.2 Analysis of Covariance (ANOVA)

It is one of the statistical methods to study the significance of the differences between two or more independent samples in the event that there is an effect of one or more independent variable on one dependent variable.

6.1.3 Chi Square Regression test (Ca2)

It is one of the statistical tests to find out the significant differences between the rates of different responses in one of the research categories.

6.2 Descriptive statistics of the results of the field study

6.2.1 Measuring the validity and reliability of the study tools

The following is a presentation of the results of measuring the validity, consistency and internal consistency of the variables under study.

- Validity and Stability Coefficient (Cron Bach's Alpha)

The validity and reliability coefficients (Cron Bach's Alpha) were calculated for the survey questions in each study category, to examine the reliability of the survey questions and to examine the reliability of these questions in the analysis, where the values of the validity and reliability coefficients, whose coefficients were calculated using the square root method for the study categories, were in the following table:

Table 4: Internal Consistency of managers' survey sections

Name of the axis	No. of phrases	Factor of honesty for Cron Bach's Alpha	Stability coefficient
1- Transportation Department	5	0.868	0.932
2- Storage management	5	0.867	0.931
3- Logistic knowledge management	5	0.878	0.937
4- Information technology logistics	5	0.914	0.956
5- Dimensions of performance levels	12	0.962	0.981
6- Corporate performance levels in light of the application of logistical management	10	0.895	0.946

Source: Author.

From the table it appears to the researcher that the validity and reliability coefficients are acceptable for the survey questions as a whole, because all the values of honesty and reliability coefficients exceeded (0.7) in the category of managers thus it can be said that they are good significant coefficients for

research purposes, it can be relied upon in the analysis without excluding any of the elements of the studied variables in the study category.

Table 5: Internal Consistency related to the dependent variable cross sections

Name of the axis	No. of phrases	Factor of honesty for Cron Bach's Alpha	Stability coefficient
Corporate performance levels in light of the application of logistical management	13	0.871	0.933

Source: Author.

From the table it is clear to the researcher validity and reliability coefficients are acceptable for the survey questions as a whole, because all the value of the validity and reliability coefficients exceeded (0.7) in the category of workers and therefore they are considered good significant transactions for research purposes, and also can be relied upon in the analysis without excluding any of the elements of the variables under study in the study category.

- **Measuring the validity of the internal consistency of the dimensions of the study tool (Survey)**

Identify the extent of the ability of measuring the survey dimensions of the tool for which it was developed. The following is a table for measuring internal consistency in each category:

Table 6: Correlation coefficients related to internal consistency

Dimension name	Managers
1- Transportation Department	0.945
2- Storage management	0.981
3- Logistics knowledge management	0.898
4- Logistics Information Technology	0.865
5- Dimensions of performance of distribution outlets	0.921
6- Corporate performance levels in light of the application of logistical management	0.943

Source: Author.

It is evident to the researcher from the previous table to measure the validity of internal consistency the values of the correlation coefficients were all indicative (0.01,0.05). This confirms that the validity of the internal consistency of the survey statements has been verified.

6.2.2 Descriptive statistics of the survey dimensions

In order to achieve the objectives of the field study descriptive statistics indicators have been improved for the following study dimensions: (transportation management, warehousing management, logistics knowledge management, logistics information technology, performance dimensions of distribution outlets), and the Likert quintet scale was used to measure each of the survey vocabulary as follows (Completely approval, approval, somewhat approval, disapproval, completely disapproval) and correspond to the following numbers: (1,2,3,4,5), and the level of consent may be determined by the following equation:

Level of consent = 1-N –N

Where (N) denotes the number of Approvals and are equal to (5), and the strength of an individual can be determined according to its strength on a five-point scale, "completely high, high, medium, low, and completely low."

Standard deviation and the coefficient of variation were calculated to measure the degree of differences between each element and the other due to the possibility of arranging the elements of equal mean and relative importance.

6.2.3 Examining the validity of the research hypotheses

Use simple linear regression Analysis by using the estimates of the Ordinary Least (OLS) Squares method, the Pearson correlation coefficient test, the regression and the constant limit (t), the overall model significance test (f), and some necessary tests to verify the least squares capabilities (OLS).

Results of the researcher's statistical analysis of the first sub-hypothesis of the first main hypothesis of the managers and worker's category showed the following:

6.2.4 Overall Category

Dependent variable: performance of distribution ports (Y)

Table 7: Test of regression coefficient and correlation results for all independent dimensions

Independent variable	Regression coefficient	Values t	Significance level	Decision when (α = 0.05	Pearson Correlation Coefficient r Total	Deren Watson value D w
Dimensions of logistics management	0.922	20.78	0.0	Moral	0.851	1.746

Source: Author.

Table 8: Analysis of variance ANOVA For the first sub-imposition of the first principal imposition, the class of managers

Sources of difference	Degrees of freedom	Values F	Significance level	Decision is upon α = 0.05	Coefficient of determination r²	Unexplained rate%
Regression Residuals	1 164	4318	0.0	Moral	72.5%	27.5%

Source: Author.

DW 1.643 =Du ,1.616= Dl Tabular values extracted from Deren-Watson tables

6.3 From the results of the statistical analysis of the hypothesis, the following emerged to the researcher:

6.3.1 Value of the significance level of the Pearson correlation coefficient test as well as the regression coefficient in the estimated model is less than the value of the significance level α = 0.05 this means that there is a statistically significant relationship between the dimensions of logistics management and the companies' performance levels.

6.3.2 Pearson correlation coefficient signal in the estimated model is positive and the regression coefficient signal is also positive this is an indication of a positive statistically significant correlation between the dimensions of logistics management and the performance levels of companies. In other words, it can be asserted that the more reliance on transportation management as one of the elements of logistical management, this will lead to an increase in the performance of companies from the managers' point of view.

6.3.3 To fully test the model's significance, the value of the significance level in the ANOVA table was less than the value of the significance level $\alpha = 0.05$, and this means that the researcher can rely on the estimated model entirely, and the researcher can also generalize the sample results to the population in question.

6.3.4. The value of the coefficient of determination was 72.5% = r^2, which means that the changes that occur in the elements of the logistics management are responsible for explaining 72.5% of the changes that occur in the performance of the distribution outlets individually and there is a rate of 27.5% due to other factors in addition to the error limit. Random error.

6.3.5. Verify Ordinary Least Squares (OLS)

- Checking the Autocorrelation issue calculated Durban Watson statistic value was 1.746 = D w Given the tabular values calculated value is between the two table values (Du, 4-Du) this means that there is no self-correlation problem.

- Identify the residue distribution (Random errors) showing the distribution of residues.

It appears to the researcher that the errors have the standard normal distribution in the form of convergence with a mean (zero) and a standard deviation (1).

So, the researcher can reject the hypothesis in its nihilistic form and accept the assumption in the alternative form to him which stated that "there is a moral relationship statistically significant for the dimensions of logistics management on the levels of corporate performance and this is the opinion of the managers".

6.4 Field study results

Table 9: Results of H_{01}

Independent variable	Dependent variable	Statistical significance when $\alpha = 0.05$	Arrangement	Effect size%
1- Transportation Department 2- Storage Department	Performance of companies Levels Direct and indirect distribution.	Moral	First	84.3%
		Moral	Second	85.1%

Source: Author. Therefore; we are going to reject the null hypothesis H_{01} as per there is a strong correlation between transportation and storage and organizational performance.

Table 10: Results of H$_{02}$

Mediating variable	Dependent variable	Statistical significance when α = 0.05	Arrangement	Effect size%
1- Logistic Information Technology	Performance of companies Levels Economies of Distribution Channels	Moral	First	% 79.5

Source: Author.

Therefore; we are going to reject the null hypothesis H$_{02}$ as per there is a strong correlation between logistic information technology and organizational performance.

Table 11: Results of H$_{03}$

Independent variable	Dependent variable	Statistical significance when α = 0.05	Arrangement	Effect size%
1- Effective logistic Knowledge Management	Performance of companies Levels Efficiency of distribution cost	Moral	First	%70.5

Source: Author.

Therefore; we are going to reject the null hypothesis H$_{03}$ as per there is a strong correlation between effective logistic knowledge management and organizational performance.

6.5 Results of multiple regression of H$_0$:

6.5.1 Managers: Dependent Variable: Firms' Performance Levels (Y)

Table 12: Results of H$_0$ regression coefficient and correlation results.

Independent variable	Regression coefficient	Values t	Significance level	The decision when (α = 0.05)	Pearson Correlation Coefficient r Total	Durban Watson value D w
1-Transportation Department	0.146	2.25	0.025	Moral		
2- Storage management	0.415	5.59	0.0	Moral		
3- Logistics knowledge management (Mediating)	0.317	4.71	0.0	Moral	0.955	3.083
4- Logistics Information Technology	0.386	7.154	0.0	Moral		

Source: Author.

Table 13: Analysis of variance ANOVA for the first hypothesis first overall Category of Managers

Sources of difference	Degrees of freedom	Values F	Significance level	Decision is upon α = 0.05	Coefficient of determination R^2	Unexplained rate%
Regression Residuals	4 161	421.14	0.0	moral	91.3%	8.7%

Source: Author.

DW 1.643 =Du ,1.616= Dl Tabular values extracted from Durban-Watson tables

6.6 Results of the statistical analysis of the hypothesis, where the researcher found the following:

- Value of the significance level of the Pearson correlation coefficient test was also, the regression coefficient in the estimated model is less than the value of the significance level α =0.05 this means that there is of a statistically significant relationship between transportation management, storage management, logistics knowledge management and logistics information technology and corporate performance levels from the point of view of the managers of those companies.

- Signal multiple regression coefficients in the estimated model Positive sign this is an indication of a statistically significant direct correlation between all the variables mentioned and the performance levels of the companies from the point of view of the managers of the companies under study.

- To test the overall significance of the model was the value of the significance level in the ANOVA table less than the value of the significance level α= 0.05 this means that the researcher can rely entirely on the estimated model also, the researcher can circulate the results of the sample to the community in question.

- Value of the total determination coefficient is r^2 = 91.3% this means that the changes that occur in the elements of the previous logistics management are responsible for explaining 91.3% of the changes that occur in the performance levels of companies individually. A rate of 8.7% is attributed to other factors plus, random error.

- **Ensuring the Ordinary Least Squares (OLS):**

  o Confirming the Autocorrelation problem: The value of the calculated Durban Watson statistic was = 2.083 D w given the tabular values, the calculated value lies between the two table values (Du, 4Du) this means that there is no self-correlation problem.

  o Identify the residue distribution (Random errors) the following diagram shows the distribution of residues.

It appears to the researcher that the errors have the standard normal distribution in a converging fashion with a mean (zero) and a standard deviation (1).

From the above, the researcher can reject the hypothesis in its nihilistic form and accept the assumption in the alternative picture, which was stated on it "There is a significant statistical relationship for the elements of logistics management on the performance levels of companies from the managers' point of view."

7. CONCLUSION AND RECOMMENDATION

The results of the field study backs-up the theorized model of the researcher as well as the previous results of scholars. The model of research mainly has been based on three theoretical categories: one concerned with resource allocation of the firm; the other with its economies and the third with its hierarchy (Vlachos, 2016). The hypotheses were formulated mainly concerning three major independents concerning reverse logistics and all were impacting organizational performance.

If we look at these results, we will find out that:

7.1 Null Hypothesis 1

H_{01}: There is no significant impact between supply chain coordination /integration and organizational performance in the Egyptian chemical sector.

This is in terms of coordination and integration between transportation and storage and performance will be measured using efficiency of direct and indirect distribution.

From the above results we see that we fail to accept H_{01} because the statistical data showed an impact between coordination/integration and organizational performance. This means that when coordination/integration was implemented correctly organizational performance improved. This result agrees with the results performed by(Vlachos, 2016), (Kenneth &Green, 2008)and (Natasha RISTOVSKA, 2017).

7.2 Null Hypothesis 2

H_{02}: Logistic Information Technology does not mediate the relationship between knowledge management and coordination and organizational performance in Egyptian chemical sector.

This is in terms of logistic information technology and performance will be measured using economics of distribution channels.

From the above results we also fail to accept H_{02} as per the statistical data shows significant impact between using information technology and performance economies of organizations in the chemical sector. This shows an agreement with previous data performed by (Mentzer, 2004), (Springinklee, 2012) and (Natasha RISTOVSKA, 2017).However, it contradicts with the results performed by , (Vlachos, 2016). As they all argued the effect of information technology and recording in their work. As results show that as knowledge and coordination builds an effective logistic information technology system emerges. Thus, organizational performance gets better. Therefore, logistic information technology mediates the relationship between knowledge management and coordination and performance management.

7.3 Null Hypothesis 3

H_{03}: There is no significant impact between applying organizational incentives and organizational performance in Egyptian chemical sector.

This is in terms of effective logistic knowledge management and performance will be measured using efficiency of distribution cost.

Statistical data collected from field study on Egyptian Chemical sector showed an impact over rewarding knowledge workers by using remote work before lock down as an incentive to increase work productivity. Therefore, we fail to accept the third null hypothesis. Our results behaved in the same way as the work of

(Mamad, 2013)in the field of innovation incentive and knowledge management, (Bourlakis, 2014)and (Vlachos, 2016).

H_0: There is no significant impact between reverse logistic management dimensions and organizational performance.

Therefore, we fail to accept that reverse logistic management has no impact on organizational performance in the Egyptian Chemical Sector. This result is based on the collective interaction among all previous factors: transportation and storage integration and coordination, logistic technology and the usage of knowledge management as an incentive tool.

Summing up this paper we recommend to research the other two reverse logistic dimensions not tested in this paper which are: closed loop capability and conformity capability.

Also, we recommend to cross results among sectors in order to achieve total generalizability of results.

REFERENCES

Bourlakis, M.; Maglaras, G.; Aktas, E.; Gallear, D. and C. Fotopoulos. (2014). Firm size and sustainable performance in food supply chains: Insights from Greek SMEs. *International Journal of Production Economics 152:*, 112-130.

Francis, G. H.; and Waiganjo, E. (2014). Role of Supply Chain Practices on Customer Satisfaction in the Printing Industry in Kenya: A Case Study of Morven Kester East Africa Limited. *International Journal of Academic Research in Business and Social Sciences*, 4 (10), 128–143.

Fugate, B.S.; Mentzer, J.T. & Stank, T.P. (2010). Logistics Performance: Efficiency, Effectiveness, and Differentiation. *Journal of Business Logistics, 31 (1),* 43–62.

Gunasekaran, A.; and E. W. T. Ngai. (2003). The successful management of a small logistics. *International Journal of Physical Distribution & Logistics*, 825-842.

https://bnokalyoum.com/2021/07/11/. (n.d.).

https://www.weforum.org/agenda/2020/09/chemical-and-materials-industry-impact-stimulus-packages/. (n.d.).

Karimi, E.; & Rafiee, M. (2014). Analyzing the Impact of Supply Chain Management Practices on Organizational Performance through Competitive Priorities (Case Study: Iran Pumps Company). *International Journal of Academic Research in Accounting, Finance and Management Sciences,* 4 (1), 1–15.

Kenneth W.; Green, Jr; Dwayne Whitten &R. Anthony Inman. (2008). The impact of logistics performance on organizational performance in a supply chain context. *Supply Chain Management, 13 (4),* 317-327.

Kenyon, G. N.; & Meixell, M. J. (2007). Success Factors and Cost Management Strategies for Logistics Outsourcing. *Journal of Management and Marketing Research, 7 (1),* 1–17.

Mamad, M.; & Chahdi, F. O. (2013). Collaboration within the Supply Chain: Perception for the Automotive Industry in Morocco. *International Journal of Academic Research in Accounting, Finance and Management Sciences, 3 (3),* 211–220.

Mentzer, J.T.; Min, S., & Bobbitt, M.L. (2004). Toward a unified theory of logistics. *International Journal of Physical Distribution and Logistics Management, 34 (8),* 606–627.

Natasha RISTOVSKA, Sasho KOZUHAROV, Vladimir PETKOVSKI. (2017). The Impact of Logistics Management Practices on Company's Performance. *International Journal of Academic Research in Accounting, Finance and Management Sciences,* 245-252.

Springinklee, M.; & Wallenburg, C. M. (2012). Improving Distribution Service Performance through Effective Production and Logistics Integration. *Journal of Business Logistics, 33 (4),* 309–323.

Vlachos, I. P. (2016). Reverse logistics capabilities and firm performance: the mediating role of business strategy. *International Journal of Logistics Research and Applications, 19 (3),* 1–19.

تأثير ممارسات الإدارة اللوجيستية العكسية على مستويات أداء الشركات: دراسة ميدانيه للقطاع الكيميائي المصري أثناء جائحة كوفيد

د.إنجى حسن نشأت   د. هالة الصدفى بكرى

ملخص البحث باللغة العربية

تهدف هذه الورقة إلى اختبار ما إذا كان هناك تأثير للأبعاد اللوجستية العكسية على مستويات الأداء التنظيمي الاقتصادي في قطاع الكيماويات المصري. تم إختبار ثلاث نظريات لوجستية عكسية؛ الأولى معنيه بالموارد التنظيمية؛ أما الثانيه تختبراقتصاداته والثالثه تتعلق بالتسلسل الهرمي (Vlachos، 2016). لقد تمت دراسة ثلاثة متغيرات رئيسية مستقلة: التنسيق/ التكامل وتكنولوجيا المعلومات والحوافز. كل منهم يقيس مدى تأثيره على الأداء التنظيمي والاقتصادي من منظوره.

هذه دراسة ميدانية أجريت على قطاع الكيماويات المصري. تم جمع البيانات من 10 شركات تقع في 4 محافظات القاهرة والجيزة والإسكندرية والقليوبية. استهدف المسح المديرين وكان مكونا من ستة أقسام. العينة قيد التحقيق كانت 214 مديرا فقط 162 إجابة كانت صحيحة. اعتمد المسح على شكل مقياس ليكرت ذو 5 فواصل زمنية.

وقد أظهرت النتائج أن هناك تأثيرا بين المتغيرات اللوجستية العكسية والأداء التنظيمي. وبالتالي، فشلت الدراسة في قبول جميع الفرضيات الصفرية الثلاث. أجريت جميع القياسات الإحصائية المستخدمة في الدراسة باستخدام SPSS 27. واستخدمت اختبارات Anova و Chi المربعة لاختبار العلاقات بين التابعين والمستقلين. هذه الدراسة عبارة عن دراسة مقطعية لمسح واحد وتقنية إحصائية للعينة الطبقية.

تم إجراء هذه الدراسة في ظل ظروف غير مسبوقة من إغلاق كوفيد. اقتصر التحليل اللوجستي فقط على الممارسات التي سبقت قياسات الحجر الصحي المحلية وخلال فترة الحجر الصحي أيضا. كما أنه هناك بعدين لوجستيين عكسيين غير مدرجين في هذه الدراسة.

ولقد أجريت هذه الدراسة في ظل ظروف جائحة كوفيد. تم الاتصال بعدد كبير من المديرين وكان عدد المجتمع الإحصائي كبيرا. يعتبر قطاع الكيماويات المصري قطاعا مهما ولكنه لا يخضع للدراسه فيما يتعلق بقياسات الإدارة اللوجستية. فلذلك جائت نتائج هذا البحث لتحسين استراتيجية تدابير الإدارة اللوجستية في قطاع الكيماويات المصري ودراسة مدى توافقها مع النتائج العالمية.

الكلمات الدالة: الخدمات اللوجستية العكسية - سلسلة التوريد - إدارة الأداء - إستراتيجية الأعمال - قطاع الكيماويات المصري.

Suggested Citation according to APA Style