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**THE REALITY OF INTERNAL INTEGRATION OF THE SUPPLY CHAIN  
IN TARTOUS CEMENT COMPANY FOR THE MANUFACTURING OF  
CEMENT AND BUILDING MATERIALS: A CASE STUDY**

Salsal Kanaan, Ayman Chiha, Nabela Suleiman

Department of Business Administration, Faculty of Economics, Tartous University

**ABSTRACT**

This study aims at identifying the reality of the internal integration of the supply chain in Tartous Cement Company for the manufacturing of cement and building materials. In this study, the researcher relied on case study methodology and used a questionnaire checked for the tests of honesty and consistency in a previous study. The paragraphs covered the concept of internal integration. The questionnaire was distributed to the senior management committee at the cement factory to obtain the necessary data for the study and was administered by the researcher himself. The study community included the engineers and managers of the cement plant. The valid questionnaires, which are 50 in number, were processed and analyzed by the computer for conclusions. One of the most important results is that the reality of internal integration in the cement plant is generally strong, but there are some obstacles including weakness of communication using modern technology.

**Keywords:** Internal integration, Supply chain.

**INTRODUCTION**

Successful supply chain management relies on organization, teamwork, and collaborating effectively. As organization is becoming more specialized and globalized, it becomes critical for it to manage the entire network of supply in order to optimize the overall performance. Supply chain integration practices are considered a powerful weapon to gain competitive advantages. Moreover, linking performance measurement systems to supply chain integration practices can lead to increased success of supply chain initiatives. Organizations need to integrate their supply chains to secure maximum support for competitiveness in their market (Kemunto, 2014). (Sabir et al., 2014) define the integration of the supply chain as: the degree to which the manufacturer cooperates strategically with the partners in the supply chain, in order to achieve effective and efficient flows of goods and services, and to provide maximum value to customers. The concept of supply chain integration has recently gained widespread attention in the supply chain studies

(Schoenherr et al., 2012) as it has gained great importance, especially since the complexity of the business environment requires companies to work in a more collaborative manner to facilitate the flow of information and resources among the partners in the supply chain (Caridi et al., 2014). The process of integration of supply chain management goes through four main stages as shown in figure (1).

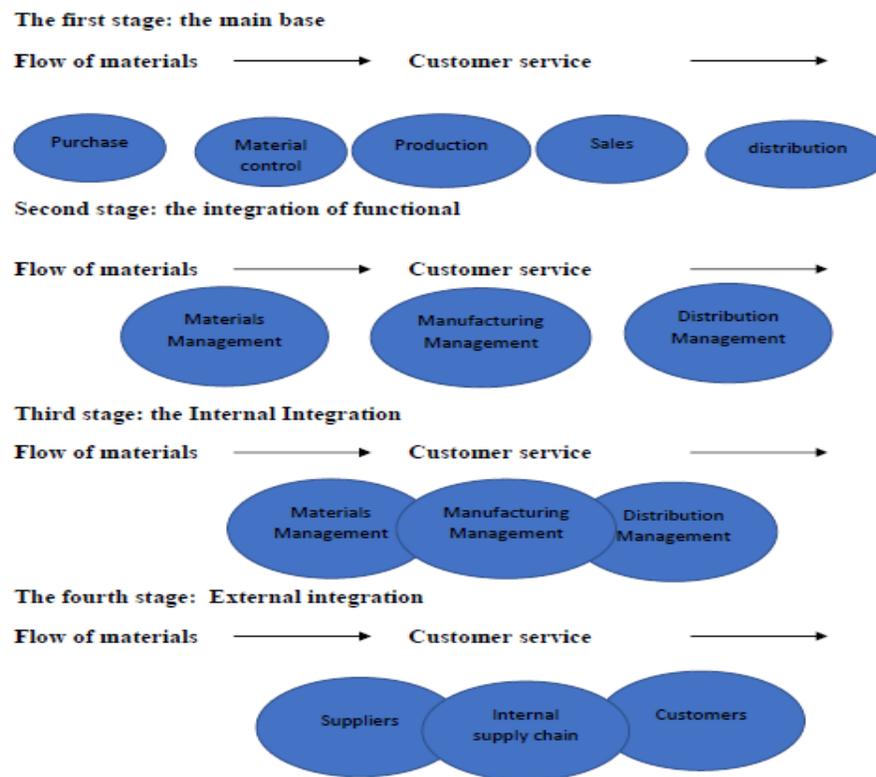


Figure of preparation (Sheikh Dib, 2004, p. 83)

**Fig. 1: Illustrates the stages of supply chain management integration**

Company's internal integration according to (Flynn et al., 2010) refers to breaking functional barriers and working with different divisions within the organization as a unit. Here, the functional divisions of the organization are viewed as an integrated process rather than functional silos based on traditional division and specialization. Operating and production as a single process requires information sharing, joint planning, and cross-functional teams to remove functional barriers among departments and increase collaboration in order to achieve the ultimate goal of meeting customer requirements.

Internal integration necessarily involves multiple functional teams, combining a carefully selected group of specialists who share information and make decisions about products, processes, and the manufacturing in a common and synchronized manner. Internal integration also implies that each process is driven by an administrative team composed of managers from each administrative function, including marketing, sales, finance, production, procurement, logistics, research, and development. These teams are responsible for developing and implementing actions at the strategic level as well as at the operational level.

All in all, we can say that good internal integration enables companies to identify, combine, and coordinate appropriate internal resources to improve capabilities across multiple aspects such as quality, performance, cost, and delivery (Otchere et al, 2013).

There have been many studies concerning the field of supply chain integration, the most important of which is the study of (Sun, et al., 2009). This study aimed at examining the interactions of internal integration, supplier integration, and customer integration and showing their impact on the company's operational and financial performance. The methodology it employed depended on collecting data from 139 Chinese manufacturers and analyzing them using hierarchical regression analysis. The results of the study showed that supplier integration was directly related to the supplier's operational performance. Although internal integration has nothing to do with the supplier's operational performance, the interaction of internal integration with supplier integration is related to the operational performance of the supplier. Moreover, the customer's operational performance does not have a direct impact on financial performance, but contributes to improved financial performance through its positive impact on customer operational performance.

The Study of (Flynn, et al., 2010) aimed at examining internal integration, supplier integration, customer integration, and their impact on the company's operational performance and business performance as well as studying the possibility of mediating any variable of the previous variables of the relationship between the remaining variables and operational performance. The most important results are that there is a significant direct correlation between internal integration and operational performance. The addition of the integration of customers and suppliers of the model resulted in a significant change in R<sup>2</sup>, indicating that the addition of customer and supplier integration contributed significantly to the predictive power of the model. Customer integration was directly related to operational performance, given the relationship between internal integration and operational performance, while resource integration was not related to it.

Examining previous studies, we have found that these studies have addressed the concept of supply chain integration through its three dimensions: customer integration, internal integration,

and supplier integration. They studied the impact of integration on performance by identifying the dimensions of integration affecting performance and the interpretation of this relationship or impact. Consequently, these studies examine the causal relationship between overall integration and performance, while our current study is a case study that aims at identifying the reality of internal integration as a dimension of supply chain integration in Tartous Cement Company.

Despite the importance of the internal integration of the supply chain and its effect on cost saving, speed, and time, this subject has not received the sufficient attention regarding public and private institutions in Syria and the Arab world. The scientific significance of the research appears in its accurate identification of the concept of internal integration of the supply chain. For the senior management of Tartous Cement Company for the manufacturing of cement and building materials, the accurate identification of the concept of internal integration of the supply chain shows the reality of the internal integration of their supply chain and the constraints that limit this integration and its effectiveness, and thus proposes solutions to it.

Tartous Cement Company for the manufacturing of cement and building materials is subject to the work of a group of directorates, and the production process includes many stages. Therefore, the effective integration of all departments and directorates which the company consists of will improve the overall performance of this organization. In general, the internal integration of the supply chain is considered the basis for achieving the other dimensions of integration in any organization. Therefore, this research will explore the reality of the internal integration of the supply chain in Tartous Cement Company for the manufacturing of cement and building materials and examine the constraints facing and limiting it, and then propose the recommendations necessary to activate this integration.

Thus, the main question in our research is the following:

What is the reality of the internal integration of the supply chain in Tartous Cement Company for the manufacturing of cement and building materials?

The scientific significance of the research appears in its proposed accurate identification of the concept of internal integration of the supply chain.

For the senior management of Tartous Cement Company for the manufacturing of cement and building materials, the accurate identification of the concept of internal integration of the supply chain shows the reality of the internal integration of their supply chain and the constraints that limit this integration and its effectiveness, and thus proposes solutions to it.

## **METHODOLOGY**

The research was conducted in Tartous Cement Company (Tartous - Syria) which was established on 23/6/1977 and mainly produces black Portland cement.

This study is based on case study methodology which enables researchers to examine data in a specific context closely. In most cases, the research deals with a small geographical area, or a very limited number of individuals as subjects of study. The objective of the case study methodology is to explore a contemporary phenomenon through a detailed analysis of its natural context based on a limited number of events or circumstances and the relationships between them (Zainal, 2007). Primary data were collected using a double questionnaire and an interview. For the questionnaire, it was specially modified to measure the internal integration of the supply chain at the cement factory in Tartous. Based on the questionnaire designed by Otchere et al. (2013), where the previous researcher conducted all the tests of honesty and validity necessary to ensure its safety. The research community consists of senior management of Tartous Cement Company and all engineers in the company's directorates who are qualified to give information about the research problem. They are 52 engineers and 8 managers. The researcher distributed the questionnaire to the largest number of engineers in the directorates of the company in an attempt to limit the entire society. Thus, the number of valid and complete questionnaires reached 50 which were analyzed by the computer using the SPSS program. The time span of the research was limited to the last third of 2017, and the spatial boundaries were limited to the Tartous Cement Company.

## **RESULTS AND DISCUSSION**

### **First: descriptive statistics**

The sample of the study is distributed by sex variable

**Table 1: The distribution of the study sample by sex variable**

|       |      | sex       |         |               |                    |
|-------|------|-----------|---------|---------------|--------------------|
|       |      | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid | Male | 50        | 100.0   | 100.0         | 100.0              |

Table prepared by the researcher based on the statistical results of the analysis of the survey data using SPSS program

We note from Table (1) that the sample consisted only of the male element which predominates over the employees in the cement factory because of the nature of the work.

Distribution of the sample of the study according to the variable of scientific qualification

**Table 2: The distribution of the sample of the study according to the variable of scientific qualification**

| scientific qualification |            |           |         |               |                    |
|--------------------------|------------|-----------|---------|---------------|--------------------|
|                          |            | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid                    | University | 50        | 100.0   | 100.0         | 100.0              |

Table prepared by the researcher based on the statistical results of the analysis of the survey data using SPSS program

We note from Table (2) that all the members of the sample are qualified with university degrees, where they reached 50 and 100% of the total sample, and this is due to the employees of the administrative departments, all of them engineers.

Distribution of the sample of the study according to the variable level of employment

**Table 3: The distribution of the sample of the study according to the variable level of employment**

| level of employment |          |           |         |               |                    |
|---------------------|----------|-----------|---------|---------------|--------------------|
|                     |          | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid               | Director | 8         | 16.0    | 16.0          | 16.0               |
|                     | Employee | 42        | 84.0    | 84.0          | 100.0              |
|                     | Total    | 50        | 100.0   | 100.0         |                    |

Table prepared by the researcher based on the statistical results of the analysis of the survey data using SPSS program

Table (3) shows that the largest percentage of the sample is employees, with 42 persons representing 84.0% of the total sample. The rest percentage of the sample includes managers, 8 persons and their percentage is 16%.

**Second: deductive statistics:**

We will start with the results of the mean and standard deviation as well as the frequency of the sample responses for each paragraph of the questionnaire to identify the reality of internal integration in the cement plant in detail.

**Table 4: The mean and standard deviation of the seventh paragraph**

| Integrate data into operational processes among all employees |      |
|---|------|
| Mean  | 5.00 |
| Std. Deviation  | .000 |

The table is prepared by the researcher using the SPSS program

**Table 5: The frequencies and their percentages for the seventh paragraph**

| Integrate data into operational processes among all employees |         |           |         |               |                    |
|---|---------|-----------|---------|---------------|--------------------|
|   |         | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid   | Very OK | 50        | 100.0   | 100.0         | 100.0              |

The table is prepared by the researcher using the SPSS program

**Table 6: The average and standard deviation of the fourth paragraph**

| Ease of information flow between different departments |      |
|--|------|
| Mean   | 4.96 |
| Std. Deviation   | .200 |

The table is prepared by the researcher using the SPSS program

**Table 7: The frequencies and their ratios to the fourth paragraph**

| Ease of information flow between different departments |         |           |         |               |                    |
|--|---------|-----------|---------|---------------|--------------------|
|  |         | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid  | OK      | 2         | 4.0     | 4.0           | 4.0                |
|  | Very OK | 48        | 96.0    | 96.0          | 100.0              |
|  | Total   | 50        | 100.0   | 100.0         |                    |

The table is prepared by the researcher using the SPSS program

Table (4) shows that the highest average obtained by the paragraph "Integrating data in operations among all employees", where the average reached 5 completely without any standard deviation, where all respondents responded very well as shown in table (5) , Indicating the full approval of sample members on the strength of data integration in operational processes among all employees.

Table (6) shows that the second highest average is the "ease of the flow of information among the different departments", where the average reached 4.96, with a weak standard deviation of 0.200, with 48 respondents responding very strongly. Table (7) also.

**Table 8: The average and standard deviation of the second paragraph**

| Different departments in your company exchange technical information with each other quickly when required. |      |
|---|------|
| Mean  | 4.88 |
| Std. Deviation  | .332 |

The table is prepared by the researcher using the SPSS program

**Table 9: The frequencies and their ratios to the second paragraph**

| Different departments in your company exchange technical information with each other quickly when required. |         |           |         |               |                    |
|---|---------|-----------|---------|---------------|--------------------|
|   |         | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid   | OK      | 6         | 12.0    | 12.0          | 12.0               |
|   | Very OK | 44        | 88.0    | 88.0          | 100.0              |
|   | Total   | 50        | 100.0   | 100.0         |                    |

The table is prepared by the researcher using the SPSS program

Table 8 shows that the third highest score obtained by paragraph "Different departments in your company exchange technical information with each other quickly when required", averaging 4.88 and with a weak standard deviation of 0.322, This indicates the consent of the sample to exchange departments of information with each other quickly when such information is needed, Through the interview with the director of planning in the lab engineer Ali Ali, he confirmed to the researcher this result. He said: "By telephone communication from any department, the department can obtain the information required easily and without any presence of the mentality of the silo".

**Table 10: The mean and standard deviation of the first paragraph**

| Various departments in the company cooperate with the company's development program |      |
|---|------|
| Mean  | 4.56 |
| Std. Deviation  | .507 |

The table is prepared by the researcher using the SPSS program

**Table 11: The frequencies and their ratios to the first paragraph**

| Various departments in the company cooperate with the company's development program |         |           |         |               |                    |
|---|---------|-----------|---------|---------------|--------------------|
|   |         | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid   | OK      | 22        | 44.0    | 44.0          | 44.0               |
|   | Very OK | 28        | 56.0    | 56.0          | 100.0              |
|   | Total   | 50        | 100.0   | 100.0         |                    |

The table is prepared by the researcher using the SPSS program

Table (10) shows the fourth highest average obtained by the paragraph "Different departments in the company cooperate with the company development program" Where the average reached 4.56, with a weak standard deviation as well, where there is no dispersion in the data as we see in table (11), where 22 people responded by OK, while the rest of the 28 people responded very well, and therefore the average corresponds to a very OK on the scale Likert. In other words, the

various departments cooperate with the company's development program, the thing which was confirmed by the director of planning at the laboratory engineer Ali Ali who pointed out that the different departments in the lab cooperate greatly to achieve the plan, as well as to participate in any program to develop the plant. According to him, the Pharaoh Group Company signed a contract with the management of the plant to develop the production lines. There is great cooperation by all departments to assist the company in the process development.

**Table 12: The average and standard deviation of the ninth paragraph**

| Our company shares stock level from one department to another. |      |
|--|------|
| Mean   | 4.52 |
| Std. Deviation   | .770 |

The table is prepared by the researcher using the SPSS program

**Table 13: The frequencies and their ratios for the ninth paragraph**

| .Our company shares stock level from one department to another |         |           |         |               |                    |
|--|---------|-----------|---------|---------------|--------------------|
|  |         | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid  | neutral | 8         | 16.0    | 16.0          | 16.0               |
|  | OK      | 8         | 16.0    | 16.0          | 32.0               |
|  | Very OK | 34        | 68.0    | 68.0          | 100.0              |
|  | Total   | 50        | 100.0   | 100.0         |                    |

The table is prepared by the researcher using the SPSS program

Table (10) shows the fifth highest average obtained by the paragraph: "Our company shares the level of inventory from one department to the other where the average was 4.52, and the standard deviation is also weak. There is no dispersion in the data, but more dispersion than in the previous charts as we see in table (13) where 8 people answered by neutral and 8 by consensus, while the remaining 34 responded with approval very. Thus, the average corresponds to a very OK score on the Likert scale, which means that there is a share of the stock level from any department to the other sections within the factory. This was confirmed by the commercial director Engineer Bassam Ali who confirmed that there is a sequence in the processes that takes place in the production section. Thus, the need for materials in production among departments does not exist, but for any material that is not included in the production, there is a high degree of flexibility and integration among sections.

**Table 14: The mean and standard deviation of the third paragraph**

| There are regular inter-departmental meetings |      |
|---|------|
| Mean  | 4.44 |
| Std. Deviation                                | .651 |

The table is prepared by the researcher using the SPSS program

**Table 15: The frequencies and their ratios for the third paragraph**

| There are regular inter-departmental meetings |         |           |         |               |                    |
|---|---------|-----------|---------|---------------|--------------------|
|   |         | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid   | neutral | 4         | 8.0     | 8.0           | 8.0                |
|   | OK      | 20        | 40.0    | 40.0          | 48.0               |
|   | Very OK | 26        | 52.0    | 52.0          | 100.0              |
|   | Total   | 50        | 100.0   | 100.0         |                    |

The table is prepared by the researcher using the SPSS program

Table 14 shows the sixth highest average obtained by paragraph: "Inter-departmental periodic meetings" Where the average to 4.44, and standard deviation is also weak, there is no dispersion in the data, as we can see in table (15), where two people responded by neutral and 20 people OK, while the rest of the number of 26 people. Thus, the average corresponds to the degree of very OK on the Likert scale that there are periodic joint meetings among the departments. Engineer Firas Hassan, the administrative director of the lab, assured us that there is a permanent administrative committee where all managers meet with any party who needs any queries or assistance.

**Table 16: The average and standard deviation of paragraph 5**

| Different departments in the company provide their plans to each other |      |
|--|------|
| Mean   | 4.24 |
| Std. Deviation   | .436 |

The table is prepared by the researcher using the SPSS program

**Table 17. The frequency and its relation to the fifth paragraph**

| Different departments in the company provide their plans to each other |         |           |         |               |                    |
|--|---------|-----------|---------|---------------|--------------------|
|  |         | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid  | OK      | 38        | 76.0    | 76.0          | 76.0               |
|  | Very OK | 12        | 24.0    | 24.0          | 100.0              |
|  | Total   | 50        | 100.0   | 100.0         |                    |

The table is prepared by the researcher using the SPSS program

Table (16) shows the seventh highest average obtained, by the paragraph: "The different departments in the company provide their plans to each other" where the average reached 4.24, and with a standard deviation 0.436. Thus there is no dispersion in the data, and therefore the average corresponds to a very OK score on the Likert scale, that is, the different departments provide their plans to each other. The commercial director, Engineer Bassam Ali, assured us that all departments share the output of reports that are submitted permanently to the planning department, which reports to the ministry. Thus, there is coordination among all departments and departments through the planning department.

**Table 18: The average and standard deviation of paragraph 8**

| Integrated database of internal functions through the network. |      |
|--|------|
| Mean   | 1.16 |
| Std. Deviation   | .374 |

The table is prepared by the researcher using the SPSS program

**Table 19: The frequencies and their ratios to the eighth paragraph**

| .Integrated database of internal functions through the network |             |           |         |               |                    |
|--|-------------|-----------|---------|---------------|--------------------|
|  |             | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid  | Never agree | 42        | 84.0    | 84.0          | 84.0               |
|  | not agree   | 8         | 16.0    | 16.0          | 100.0              |
|  | Total       | 50        | 100.0   | 100.0         |                    |

The table is prepared by the researcher using the SPSS program

**Table 20: The average and standard deviation of the sixth paragraph**

| Computer-based planning system across all functional units |      |
|--|------|
| Mean   | 1.12 |
| Std. Deviation   | .332 |

The table is prepared by the researcher using the SPSS program

**Table 21: The frequency and its ratio to the sixth paragraph**

| Computer-based planning system across all functional units |             |           |         |               |                    |
|--|-------------|-----------|---------|---------------|--------------------|
|  |             | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid  | Never agree | 44        | 88.0    | 88.0          | 88.0               |
|  | not agree   | 6         | 12.0    | 12.0          | 100.0              |
|  | Total       | 50        | 100.0   | 100.0         |                    |

The table is prepared by the researcher using the SPSS program

**Table 22: The average and standard deviation of paragraph 10**

| Our company uses multifunctional teams to improve the manufacturing process. |      |
|--|------|
| Mean   | 1.08 |
| Std. Deviation   | .277 |

The table is prepared by the researcher using the SPSS program

**Table 23: The frequencies and their ratios to the tenth paragraph**

| .Our company uses multifunctional teams to improve the manufacturing process |             |           |         |               |                    |
|--|-------------|-----------|---------|---------------|--------------------|
|  |             | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid  | Never agree | 46        | 92.0    | 92.0          | 92.0               |
|  | not agree   | 4         | 8.0     | 8.0           | 100.0              |
|  | Total       | 50        | 100.0   | 100.0         |                    |

The table is prepared by the researcher using the SPSS program

**Table 24: The average and standard deviation of the eleventh paragraph**

| Our company uses multifunctional teams to improve the new product |      |
|---|------|
| Mean  | 1.08 |
| Std. Deviation  | .277 |

The table is prepared by the researcher using the SPSS program

**Table 25: The frequency and its ratio to the eleventh paragraph**

| Our company uses multifunctional teams to improve the new product |             |           |         |               |                    |
|---|-------------|-----------|---------|---------------|--------------------|
|   |             | Frequency | Percent | Valid Percent | Cumulative Percent |
| Valid   | Never agree | 46        | 92.0    | 92.0          | 92.0               |
|   | not agree   | 4         | 8.0     | 8.0           | 100.0              |
|   | Total       | 50        | 100.0   | 100.0         |                    |

The table is prepared by the researcher using the SPSS program

Tables (18), (20), (22) and (24) show the lowest average of respondents' responses, obtained in the paragraphs: "Integrated database of internal functions through the network", the paragraph: "computer-based planning system across all functional units", the paragraph "Our company uses multifunctional teams to improve the manufacturing process", and the paragraph "Our company uses multifunctional teams to improve the new product" where the average reached almost 1 in all, and with a few standard deviations. There is no dispersion in the data as seen from Tables (19), (21), (23) and (25); thus, the last four averages correspond to a very disagreeable score on the Likert scale. Therefore, we conclude from the above-mentioned tables that:

- There is a lack of integrated database among internal functions through the network.
- There is no computer-based layout system across all functional units.
- There are no multifunctional teams within the lab.

Eng. Ahmed Ibrahim, Director of Planning Eng. Ali Ali, and Managing Director Eng. Firas Hassan confirmed to us in their interviews when asked about the most important obstacles that hinder internal integration in the cement factory that the most important obstacles are:

- Technology that enables all managers and departments to access data and identify inventory without having to dial.
- Defragment the warehouses so that the material of each type can be controlled and moved by the treasurer.
- To review the administrative structure so as to take into account the ease of flow of information more than it is.
- Poor distribution of labor, so as not to take into account the need, competence, experience and qualification.
- Delegation of authorities.

In the end we calculated the average of all the paragraphs, and the result was in the following table:

**Table 26: The general average of all the paragraphs of the questionnaire**

| The average of all paragraphs of the questionnaire |      |
|--|------|
| Mean   | 3.37 |

The table is prepared by the researcher using the SPSS program

We note from table (26) that the average of all the paragraphs of the questionnaire reached 3.37, which corresponds to the degree of approval on the Likert scale. This indicates the approval of the sample that the internal integration in the cement plant is fairly strong. According to the director of the production department, Engineer Ahmed Ibrahim, the lack of such a strong integration means a cessation of production since the work at the cement plant follows continuous shift work with 24 hours, the thing which makes internal integration a great need for non-stop production lines and thus contributes to achieving the desired results.

### **CONCLUSIONS AND RECOMMENDATIONS**

Based on the above, the following conclusions can be reached:

1. There is strength of data integration in operations among all employees.
2. Easy flow of information between different departments.
3. The need for departments to exchange information among each other quickly when that information is needed.
4. The various departments in the company cooperate with the company's development program.
5. Share the level of inventory of non-production materials from any department to other sections within the plant.
6. There is a permanent management committee where all managers meet with any party that needs any queries or assistance.
7. Different departments provide their plans to each other.
8. Lack of integrated database between internal functions through the network.
9. Lack of a computer-based planning system across all functional units.
10. There are no multi-functional teams within the lab.
11. Internal integration in the cement plant is generally strong.

**Based on the findings of this study, the following recommendations can be made:**

1- Internal integration in the cement plant is generally strong, but can be improved and made more effective, as we saw some obstacles that hinder the process of internal integration in the laboratory, and this will certainly affect the overall performance of the laboratory, so the researcher recommends avoiding these obstacles through the following:

- Keeping up with technology and adding a network of computers connected via an internal network, which enables all managers and departments to access the data at any time.
- Reviewing the administrative structure, so that it is designed in a way that increases the ease of information flow.
- Delegation of powers, especially in relation to secondary decisions, which enables all departments to integrate with each other easily and quickly without having to refer to anyone.

2- Recommends the researcher to conduct a study on the reality of integration with suppliers in Tartous Cement Company for the manufacturing of cement and building materials because of the importance of this issue in the non-stop production lines, and continuity of work in 24 hours.

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