The Effect of Manufacturing Flexibility on Organizational Performance in Business Organizations

"An Empirical Study of Al-Manaseer Concrete Products Plant"

Zakaria M. Al-Douri 1, Nawaf R.Al-muemari 2

1Prof., Business management, Bilad Alrafidain University College., Zaldouri@yahoo.com

2Business management department at Al-Isra’ University.; na1994waf@gmail.com

Abstract

The present study aimed to explore the impact of manufacturing flexibility on organizational performance. The latter flexibility is considered the independent variable. It’s measured by: (routing flexibility, material handling flexibility, mix flexibility and machine flexibility). The organizational performance is considered the dependent variable. It’s measured by: (sales growth, market share, customer satisfaction and innovation & creativity). The study’s population involves all the employees who work at Al-Manaseer concrete products plant (i.e. 250 employees). The sample was selected randomly. It consists from 125 employees who work at the latter plant. In order to meet the study’s goals, the researchers adopted a quantitative approach. They also adopted an analytical descriptive approach. They used several statistical methods, such as: the multiple regression analysis. Several results were concluded. For instance, the researchers found that manufacturing flexibility – measured by all its dimensions jointly – can significantly affect organizational performance. They also found that manufacturing flexibility – measured by material handling flexibility and machine flexibility – can significantly affect the organizational performance when it’s measured by sales growth, market share, and customer satisfaction. It was found that manufacturing flexibility – only when measured by machine flexibility and routing flexibility - can significantly affect innovation & creativity. In the light of the study’s results, the researchers recommend providing more attention to the organizational performance indicators of Al-Manaseer concrete products plant. They recommend providing more attention to the market
share indicator. They recommend providing more attention to customer satisfaction and meeting the customer demands.

**Keywords:** Manufacturing Flexibility, Organizational Performance, Business.

**Introduction:**

The intensity of the market competition has been increasing. The advanced technologies have been increasing too. Therefore, business entities became in need to adopt flexible production and manufacturing systems. Therefore, it’s necessary to develop the conventional manufacturing systems & methods. That’s because the latter methods & systems aren’t capable anymore to meet the requirements of companies. They aren’t capable anymore to detect the defects leading to wasting resources.

In the light of the aforementioned, a new expression emerged which is manufacturing flexibility. The latter flexibility can positively affect the efficiency of the organizational performance, especially in the sectors that are witnessing an intense competition. Therefore, the present study aimed to identify the manufacturing flexibility level of Al-Manaseer concrete products plant. The latter plant is affiliated with Al-Bunyan Company. The latter company is an industrial company operating in Jordan. It’s a subsidiary company that’s affiliated with Al-Manaseer.

The organizational performance is the outcome of the performance of each employee and organizational units. It’s affected by the social, economic, and cultural environments. It was found that leading companies have several things in common. For instance, their services show the highest quality level. In addition, they provide the best customer services. They innovate things regularly to meet the changing demands.

**The study’s framework and methodology:**

**The study’s framework:**

1. **Statement of the Problem:**
Manufacturing flexibility and organizational performance can significantly enable organizations to excel and compete in markets. The expression (manufacturing flexibility) emerged in response to the changes and developments that occurred in the information fields. The manufacturing flexibility of an organization can’t be imitated nor copied easily by the competing companies. Therefore, the present study aimed at exploring the role of the manufacturing flexibility in improving the organizational performance of Al-Manaseer concrete products plant. To be specific, the study’s problem is represented in the following question:

To what extent can manufacturing flexibility – measured by routing flexibility, material handling flexibility, mix flexibility and machine flexibility – affect the organizational performance of Al-Manaseer concrete products plant? The latter performance is measured by sales growth, market share, customer satisfaction and innovation & creativity.

The Study’s Significance:

The significance of the present study arises from the following:

1. The present study is significant due to its significant theoretical framework. For instance, the latter framework sheds a light on the studies that concern manufacturing flexibility and organizational performance. It also sheds a light on the meaning of manufacturing flexibility and organizational performance. The latter framework can be useful for companies’ owners and employees. For instance, it can enable companies’ owners and employees to avoid risks and achieve growth.

2. The present study aimed to identify the manufacturing flexibility level of Al-Manaseer concrete products plant. That shall enable the managers of the latter plant to raise the performance of the latter plant.

3. The present study shall participate in promoting knowledge among the managers of the latter plant about manufacturing flexibility and its impact on organizational performance. It shall participate in shedding a light in on the organizational performance of Al-Manaseer concrete products plant.
The study’s objectives:

The present study aimed to explore the impact of manufacturing flexibility on the organizational performance of Al-Manaseer concrete products plant. To be specific, the present study aimed to:

1. Identify the impact of manufacturing flexibility on the organizational performance of Al-Manaseer concrete products plant
2. Identify the impact of manufacturing flexibility on the sales growth of Al-Manaseer concrete products plant
3. Identify the impact of manufacturing flexibility on the market share of Al-Manaseer concrete products plant
4. Identify the impact of manufacturing flexibility on the customer satisfaction of Al-Manaseer concrete products plant
5. Identify the impact of manufacturing flexibility on the innovation & creativity of Al-Manaseer concrete products plant

The study’s hypotheses:

Based on the study’s problem and model, the researchers developed several hypotheses to be tested. These hypotheses are presented below:

The main hypothesis:

H.0: Manufacturing flexibility – measured by all its dimensions jointly – doesn’t have any statistically significant impact at the statistical significance level of ($\alpha \leq 0.05$) on the organizational performance of Al-Manaseer concrete products plant.

The following sub-hypotheses are derived from the main hypothesis:

The first sub-hypothesis

H0.1. Manufacturing flexibility – measured by all its dimensions jointly – doesn’t have any statistically significant impact at the statistical significance level of ($\alpha \leq 0.05$) on the sales growth of Al-Manaseer concrete products plant.
The second sub-hypothesis
H0.2. Manufacturing flexibility – measured by all its dimensions jointly – doesn’t have any statistically significant impact at the statistical significance level of ($\alpha\leq0.05$) on the market share of Al-Manaseer concrete products plant.

The third sub-hypothesis
H0.3. Manufacturing flexibility – measured by all its dimensions jointly – doesn’t have any statistically significant impact at the statistical significance level of ($\alpha\leq0.05$) on the customer satisfaction of Al-Manaseer concrete products plant.

The fourth sub-hypothesis
H0.4. Manufacturing flexibility – measured by all its dimensions jointly – doesn’t have any statistically significant impact at the statistical significance level of ($\alpha\leq0.05$) on the innovation & creativity of Al-Manaseer concrete products plant.
The study’s model

The independent variable

Manufacturing Flexibility
Routing Flexibility
Material handling Flexibility
Mix flexibility
Machine flexibility

The dependent variable

Organizational Performance
Sales Growth
Market Share,
Customer Satisfaction
Innovation & creativity

*Source: The researchers of the present study developed the study’s model based on the studies that were conducted by: Tamayo-Torres et al. (2011) and Jbouri (2009).

The operational definitions:

The researchers provided the operational definitions of the study’s terms based on the previous Arab and foreign literature:

First: Manufacturing Flexibility:

It refers to the organization’s capacity to adapt itself effectively with the changes that occur in the internal and external environment. Having the latter capacity shall enable the
organization to produce products of high quality on the right time and in the right place. It shall enable the organization to facilitate the way of carrying out operations and prevent wasting resources as much as possible.

1. **Routing Flexibility**: It refers to the plant’s capacity to use new production lines or take a new production route without having an increase in the costs nor a decrease in the product’s quality. When following the latter lines or route, one must ensure that the production process shall not be hindered.

2. **Material handling flexibility**: It refers to the process of moving or transferring the materials inside the plant in a smooth manner without affecting the course of actions. Such materials may differ in terms of size.

3. **Mix flexibility**: It refers to the organization’s capacity to produce a variety of products simultaneously. That should be done with ensuring that the products possess the intended quality. That should be done without having any negative impact on the productivity level of the plant.

4. **Machine flexibility**: It refers to the ability to use the same machine to handle and carry out different operations without incurring additional costs. It refers to the ability to use the same machine to carry out an operation in full and start another within the least possible time.

**Second: Organizational Performance:**

It refers to the gap existing between the intended goals and the goals that were met. It may also refer to the gap existing between the intended performance and the actual performance.

1. **Sales growth**: It refers to the process of raising the plant’s sales volume through encouraging employees to show a distinguished performance. Such a performance shall enable the organization to produce products of high quality that attract customers.

2. **Market share**: It refers to the competitive position that the company holds in a specific field in the market. It’s measured by the value of the company’s shares. It may be measured by the amount of the company’s products sold by in the market in comparison with the competitors.
3. **Customer satisfaction:** It refers to the extent of the customer’s satisfaction with the company’s products. Customer satisfaction can be achieved through meeting the customer demands and needs and responding fast to the change in the customer needs and taste.

4. **Innovation and creativity:** They enable the company to develop its products in order to meet the customer desires. It should be noted that companies must develop their products in an ongoing manner. Such development must be carried out in an innovative manner. That shall participate in fulfilling the customer’s needs and exceed his expectations.

**The study’s methodology:**

The researchers adopted an analytical descriptive approach.

**The Study’s Population and sample:**

The study’s population involves all the employees who work at Al-Manaseer concrete products plant (i.e. 250 employees). The sample was selected randomly. It consists from 125 employees who work at the latter plant. The latter employees were selected randomly. They were selected based on the criteria that were provided by Uma Skaran (2013, p. 294). 125 questionnaire forms were distributed to the study’s sample. However, 117 questionnaire forms were retrieved. Thus, the response rate is 93.6%.

**The Study’s Approach:**

The researchers adopted an analytical descriptive approach. That was done for exploring the relationship between the main variables. It was done for exploring the relationship between the sub-variables. Data was collected from the employees who were selected from the branches of Etihad Bank in Amman, Jordan. Data was collected to reach results and suggest recommendations.

**The Study’s Instrument:**
The scale of the present study was developed based on the scales that were developed by several researchers. To be specific, the researchers of the present study developed the scale based on the scale that was developed by J. Tamayo-Torres et al (2011) and the one that was developed by Jbouri (2009). The scale of by J. Tamayo-Torres et al (2011) aims to measure manufacturing flexibility. The scale of Jbouri (2009) aims to measure organizational performance. In order to answer the study’s questions, the SPSS program was used for analyzing the collected data and testing the study’s hypotheses.

**The instrument’s reliability:**

In order to measure the reliability of the study’s instrument, the researchers calculated the Cronbach Alpha coefficient values. Those values are presented in table (1) below:

Table (1): The internal consistency coefficient values of the study’s variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>manufacturing flexibility</th>
<th>organizational performance</th>
<th>All the variables jointly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of the Cronbach Alpha coefficient</td>
<td>0.743</td>
<td>0.884</td>
<td>0.895</td>
</tr>
</tbody>
</table>

Based on table (1), the overall value of the Cronbach Alpha coefficient is 0.895. All the values of the Cronbach Alpha coefficient are accepted. That’s because they are greater than 0.60.

**The theoretical framework**

**First: The meaning of the expression (manufacturing flexibility):**

Several researchers found that manufacturing flexibility enables organizations to handle the rapid changes and the intense competition occurring in the marketplace. It’s found that manufacturing flexibility enables organizations to handle the competitive threats and respond fast to them in the appropriate time. That’s done through making changes fast in the production lines (Mendes and Machado, 2015, p.1).
There’s a debate among researchers about the definition of manufacturing flexibility. For instance, Al-Lami and Jawad (2014) define manufacturing flexibility as a feature that enables organizations to handle uncertainty. They suggest that manufacturing flexibility enables organizations to adapt itself with the changes in the customer demands. Such adaptation is highly significant because the organization’s main function is represented in meeting the customer demands (p.58). Burger et al. (2017) define manufacturing flexibility as a feature that enables organizations to adapt with the changes occurring in the environment (p.33). Mendes and Machado (2015) define manufacturing flexibility as a feature that enables organizations to make the necessary modifications in order to adapt with environmental uncertainty. Manufacturing flexibility enables organizations to provide special attention to crucial factors, such as: time, performance and cost-related factors (p.2).

D’Souza &Williams (2000) suggest that manufacturing flexibility has numerous dimensions. They suggest that manufacturing flexibility refers to the organization’s capacity to make the necessary modifications through the manufacturing process in order to adapt with the environmental changes. Such modifications are made to respond to changes (p.578). Beach at.al. (2000) suggest that manufacturing flexibility is a multi-dimensional expression. They suggest that manufacturing flexibility can’t be defined without shedding a light on its dimensions. They suggest that manufacturing flexibility is affected by several factors, such as: corporate culture, management structure, operational technology, planning facilitation and information systems (p. 47).

Second: The dimensions of manufacturing flexibility:

The researchers selected the following manufacturing flexibility dimensions:

1. **Routing flexibility:**

The organizations that are characterized with a high routing flexibility level are capable to deal with contingencies which may occur while carrying out the production operation. Such
contingencies include failure to operate the machines due to a defect. In such a case, the organization that’s characterized with a high routing flexibility level shall choose a new rout to follow till the machine gets fixed. The new rout shall enable the organization to proceed in its production operation without stopping it. Therefore, having a high routing flexibility level shall enable the organization to save time and deliver products on the due delivery time. In addition, changing the rout shall enable organizations to produce the products faster. However, the organization must take costs & quality into consideration when taking a new rout (Al-Gasha’ami, 2013, p. 65). Al-Obaidi (2017) suggests that having a high routing flexibility level enables organizations to ensure that the products’ quality is high (p.48). D’Souza & Williams (2000) suggest that routing flexibility refers to the organization’s capacity to change the sequence of step of the production operation (P.579)

2. Material handling flexibility:

D’Souza & Williams (2000, p.579) suggest that material handling flexibility refers to the capacity of the manufacturing system to handle the differences - which can’t be controlled - between materials and equipment. Al-Lami and Jawad (2014) suggest that material handling flexibility refers to the organization’s capacity to handle various types of materials and equipment during the production operations. That’s done through facilitating the way in which the conversion process is carried. That shall participate in improving the efficiency and speed of the production system. It shall enable the organization to achieve competitive advantages. Such advantages shall enable the organization to carry out its tasks efficiently. Al-Qar’aan (2007) defines material handling flexibility as the organization’s capacity to move a variety of manufactured materials from one place to another efficiently during the manufacturing process. That’s done through uploading, offloading, moving and storing the manufactured materials under specific conditions (p.35).

3. Mix flexibility

Today, the organization’s capacity can be measured by its capacity to adapt itself with the changes occurring in the surrounding environment. The organization’s capacity can be measured through assessing the organization’s capacity to meet the customer demands and needs which
change throughout time. It’s challenging to have a high mix flexibility level because the organization must produce a variety of products simultaneously. D’Souza & Williams (2000) suggest that mix flexibility refers to the capacity of the manufacturing system to produce a variety of products and seek producing new ones (p.580). Oke (2005) suggests that mix flexibility refers to the capacity of the manufacturing system to change the products it produces within a specific time. He suggests that mix flexibility is one of the dimensions of the manufacturing flexibility (p.975). Al-Qar’aan (2007) defines mix flexibility as the organization’s capacity to produce a variety of products simultaneously in the same plant (p.9). Al-Lami and Jawad (2014) define mix flexibility as the organization’s capacity to produce a variety of products in a manner that can enhance the organization’s competitiveness in the marketplace, and meet the customer demands and needs in a constant manner (p.63).

4. Machine flexibility:

It’s considered one of the most important dimensions of manufacturing flexibility. It’s considered important because it plays an important role in the production process. Kima et al. (2013) suggest that machine flexibility refers to the number of operations that the machine can carry out without having consequences affecting the production outcomes negatively (p.5600). Al-Lami and Jawad (2014) suggest that machine flexibility enables the organization to handle the production of a variety of products without having consequences affecting the production system negatively (p.58). Al-Qar’aan (2007) defines machine flexibility as the extent of variety of the operations that can be carried through using the machine. The latter researcher defines machine flexibility as the extent of capacity to modify the product’s parts without incurring additional costs nor losing time when shifting from one operation to another (p.34). Al-Gasha’ami (2013) suggests that machine flexibility refers to machine’s capacity to carry out different operations and handle a variety of products. He suggests that having a high machine flexibility level shall enhance the organization’s competitiveness and enable it to handle the environmental fluctuations. That applies whether such fluctuations are caused by the customers or the competitors (p.64).

Third: The organizational performance:
Organizations have been providing much attention to performance in general and organizational performance in particular. That’s because the organizational performance can significantly affect the organization’s success in the light of the competitive environment that has been witnessing rapid changes. Molina et al. (2010) suggest that performance refers to the extent of achieving the intended goals in an efficient and effective manner (p.389). Jitpaiboon and Sharma (2012) define organizational performance as the extent of meeting the organization’s market and financial goals (p.142). De Waal (2010) defines organizational performance as the organization’s extent of knowledge about its resources. It can be measured by the organization’s capacity to recruit qualified people and achieve good outcomes (p.80).

Hussain (2007) defines organizational performance as the organization’s capacity to utilize its internal resources efficiently and effectively in order to achieve success and a sustainable competitive advantage (p.99). Al-Jader (2006) defines organizational performance as a significant indicator that reflects the organization’s capacity to invest the available financial, human, information and technical resources effectively (p.98). Al-Janabi (2016) defines organizational performance as the organization’s capacity to carry out a variety of operations that participate in meeting the organization’s goals (p.24).

**Results of testing the study’s hypotheses**

Before testing the study’s hypotheses, the researchers aimed to ensure that there isn’t any strong correlation between the independent variables. Therefore, the researchers calculated the variance inflation factor and the tolerance values for each independent variable. Table (2) presents these values. If the tolerance value is greater than (10) and the tolerance value is less than 0.05, it shall indicate that the variable is strongly correlated with the other independent variables. If such a correlation exists, it shall lead to a problem in the regression analysis. The latter criterion was adopted to detect any multi-collinearity problem existing between the independent variables. Based on table (2), it can be noticed that all of the VIF values are within the range of (1.252-1.157). Thus, all of them are less than 10. It can be noticed that all the tolerance values are within the range of (0.864-0.799). The latter values are greater than 0.05. Thus, there isn’t any strong correlation between the independent variables.
In order to ensure that the data is normally distributed, the Skewness coefficient values are calculated. The latter values are within the range of (2 - -2). They are presented in table (2). Thus, it was found that the study’s data is normally distributed.

**Table (2): The tolerance, variance inflation factor (VIF), and Skewness coefficient values**

<table>
<thead>
<tr>
<th>Variable</th>
<th>The tolerance value</th>
<th>The variance inflation factor (VIF) value</th>
<th>The Skewness coefficient value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routing flexibility</td>
<td>0.864</td>
<td>1.157</td>
<td>-0.358</td>
</tr>
<tr>
<td>Material handling</td>
<td>0.794</td>
<td>1.252</td>
<td>-0.257</td>
</tr>
<tr>
<td>Mix flexibility</td>
<td>0.824</td>
<td>1.213</td>
<td>-0.508</td>
</tr>
<tr>
<td>Machine flexibility</td>
<td>0.845</td>
<td>1.184</td>
<td>-0.119</td>
</tr>
</tbody>
</table>

**Testing the study’s hypotheses:**

**The main hypothesis**

*H.0:* Manufacturing flexibility – measured by all its dimensions jointly – doesn’t have any statistically significant impact at the statistical significance level of ($\alpha \leq 0.05$) on the organizational performance of Al-Manaseer concrete products plant.

In order to test the main hypothesis, the multiple regression analysis was conducted. The results of the latter analysis are presented in table (3) below:

**Table (3): The results of the multiple regression analysis for testing the main hypothesis**

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Model summary</th>
<th>ANOVA</th>
<th>Value of the regression coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R$</td>
<td>$R^2$</td>
<td>Adjusted $R^2$</td>
</tr>
<tr>
<td>The organizational</td>
<td>0.891</td>
<td>0.794</td>
<td>0.786</td>
</tr>
</tbody>
</table>
The first sub-hypothesis

**H0.1.** Manufacturing flexibility – measured by all its dimensions jointly – doesn’t have any statistically significant impact at the statistical significance level of ($\alpha \leq 0.05$) on the sales growth of Al-Manaseer concrete products plant.

In order to test the first sub-hypothesis, statistical analysis was conducted. Based on the results of the latter analysis, it was found that manufacturing flexibility – measured by material handling flexibility and machine flexibility - has a statistically significant impact at the statistical significance level of ($\alpha \leq 0.05$) on the sales growth of Al-Manaseer concrete products plant. For instance, the $R$ value is 0.843. The latter value is statistically significant at the statistical significance level of ($\alpha \leq 0.05$). The $R^2$ value is 0.710. Thus, 71.0 % of the changes in the sales growth are attributed to the change in the manufacturing flexibility – measured by material handling flexibility and machine flexibility.

Through conducting the regression analysis, it was found that the effect coefficient $\beta$ value of the material handling flexibility is 0.245. The latter value is statistically significant at the statistical significance level of ($\alpha \leq 0.05$). The calculated $T$ value of the material handling flexibility is 2.383. As for the effect coefficient $\beta$ value of machine flexibility, it is 0.615. The latter value is statistically significant at the statistical significance level of ($\alpha \leq 0.05$). The calculated $T$ value of the machine flexibility is 5.999. That means that an increase by one score in the attention provided to manufacturing flexibility – measured by material handling flexibility– shall lead to raising the sales growth by 0.245. That means that an increase by one score in the attention
provided to manufacturing flexibility – measured by machine flexibility – shall lead to raising the sales growth by 0.615.

The calculated F value is 64.904. The latter value is statistically significant at the statistical significance level of (α≤0.05). Thus, the first null sub-hypothesis is rejected. Hence, the manufacturing flexibility – measured by material handling flexibility and machine flexibility - has a statistically significant impact at the statistical significance level of (α≤0.05) on the sales growth of Al-Manaseer concrete products plant.

The second sub-hypothesis

H0.2. Manufacturing flexibility – measured by all its dimensions jointly – doesn’t have any statistically significant impact at the statistical significance level of (α≤0.05) on the market share of Al-Manaseer concrete products plant.

In order to test the second sub-hypothesis, statistical analysis was conducted. Based on the results of the latter analysis, it was found that manufacturing flexibility – measured by material handling flexibility and machine flexibility - has a statistically significant impact at the statistical significance level of (α≤0.05) on the market share of Al-Manaseer concrete products plant. For instance, the R value is 0.808. The latter value is statistically significant at the statistical significance level of (α≤0.05). The R² value is 0.653. Thus, 65.3 % of the changes in the market share are attributed to the change in the manufacturing flexibility – measured by material handling flexibility and machine flexibility.

Through conducting the regression analysis, it was found that the effect coefficient β value of the material handling flexibility is 0.241. The latter value is statistically significant at the statistical significance level of (α≤0.05). The calculated T value of the material handling flexibility is 2.141. As for the effect coefficient β value of machine flexibility, it is 0.327. The latter value is statistically significant at the statistical significance level of (α≤0.05). The calculated T value of the machine flexibility is 2.917. That means that an increase by one score in the attention
provided to manufacturing flexibility – measured by material handling flexibility – shall lead to raising the market share by 0.241. That means that an increase by one score in the attention provided to manufacturing flexibility – measured by machine flexibility – shall lead to raising the market share by 0.327.

The calculated F value is 49.916. The latter value is statistically significant at the statistical significance level of (α≤0.05). Thus, the second null sub-hypothesis is rejected. Hence, the manufacturing flexibility – measured by material handling flexibility and machine flexibility - has a statistically significant impact at the statistical significance level of (α≤0.05) on market share of Al-Manaseer concrete products plant.

**The third sub-hypothesis**

**H0.3.** Manufacturing flexibility – measured by all its dimensions jointly – doesn’t have any statistically significant impact at the statistical significance level of (α≤0.05) on customer satisfaction of Al-Manaseer concrete products plant.

In order to test the third sub-hypothesis, statistical analysis was conducted. Based on the results of the latter analysis, it was found that manufacturing flexibility – measured by material handling flexibility and machine flexibility - has a statistically significant impact at the statistical significance level of (α≤0.05) on the customer satisfaction of Al-Manaseer concrete products plant. For instance, the R value is 0.828. The latter value is statistically significant at the statistical significance level of (α≤0.05). The $R^2$ value is 0.686. Thus, 65.3 % of the changes in the customer satisfaction are attributed to the change in the manufacturing flexibility – measured by material handling flexibility and machine flexibility.

Through conducting the regression analysis, it was found that the effect coefficient β value of the material handling flexibility is 0.236. The latter value is statistically significant at the statistical significance level of (α≤0.05). The calculated T value of the material handling flexibility is 2.201. As for the effect coefficient β value of machine flexibility, it is 0.487. The latter value is statistically significant at the statistical significance level of (α≤0.05). The calculated T value of the machine flexibility is 4.562. That means that an increase by one score
in the attention provided to manufacturing flexibility – measured by material handling flexibility– shall lead to raising the customer satisfaction by 0.236. That means that an increase by one score in the attention provided to manufacturing flexibility – measured by machine flexibility – shall lead to raising the customer satisfaction by 0.487.

The calculated F value is 57.916. The latter value is statistically significant at the statistical significance level of (α≤0.05). Thus, the third null sub-hypothesis is rejected. Hence, the manufacturing flexibility – measured by material handling flexibility and machine flexibility - has a statistically significant impact at the statistical significance level of (α≤0.05) on customer satisfaction of Al-Manaseer concrete products plant.

**The fourth sub-hypothesis**

H0.4. Manufacturing flexibility – measured by all its dimensions jointly – doesn’t have any statistically significant impact at the statistical significance level of (α≤0.05) on innovation & creativity of Al-Manaseer concrete products plant.

In order to test the fourth sub-hypothesis, statistical analysis was conducted. Based on the results of the latter analysis, it was found that manufacturing flexibility – measured by routing flexibility and machine flexibility - has a statistically significant impact at the statistical significance level of (α≤0.05) on the innovation & creativity of Al-Manaseer concrete products plant. For instance, the R value is 0.837. The latter value is statistically significant at the statistical significance level of (α≤0.05). The \( R^2 \) value is 0.700. Thus, 70.0 % of the changes in innovation & creativity are attributed to the change in the manufacturing flexibility – measured by routing flexibility and machine flexibility.

Through conducting the regression analysis, it was found that the effect coefficient \( \beta \) value of the routing flexibility is 0.253. The latter value is statistically significant at the statistical significance level of (α≤0.05). The calculated T value of the routing flexibility is 2.812. As for the effect coefficient \( \beta \) value of machine flexibility, it is 0.445.

The latter value is statistically significant at the statistical significance level of (α≤0.05). The calculated T value of the machine flexibility is 4.262. That means that an increase by one score
in the attention provided to manufacturing flexibility – measured by routing flexibility – shall lead to raising the innovation & creativity by 0.253. That means that an increase by one score in the attention provided to manufacturing flexibility – measured by machine flexibility – shall lead to raising the innovation & creativity by 0.445.

The calculated F value is 61.776. The latter value is statistically significant at the statistical significance level of (α≤0.05). Thus, the fourth null sub-hypothesis is rejected. Hence, the manufacturing flexibility – measured by routing flexibility and machine flexibility – has a statistically significant impact at the statistical significance level of (α≤0.05) on innovation & creativity of Al-Manaseer concrete products plant.

Conclusion:

1. Through conducting the simple regression analysis, it was found that manufacturing flexibility – measured by all its dimensions jointly – has a statistically significant positive impact at the statistical significance level of (α≤0.05) on the organizational performance of Al-Manaseer concrete products plant. It was found that manufacturing flexibility can significantly change the dimensions of the organizational performance of the latter plant.

2. Through conducting the regression analysis, it was found that manufacturing flexibility – measured by machine flexibility – has the strongest impact on the organizational performance dimensions of Al-Manaseer concrete products plant. It was found that manufacturing flexibility – measured by routing flexibility – has the weakest impact on the organizational performance of Al-Manaseer concrete products plant. It was found that manufacturing flexibility – only when measured by machine flexibility and routing flexibility – can significantly affect innovation & creativity. It was found that manufacturing flexibility – measured by material
handling flexibility – can significantly affect sales growth, market share, and customer satisfaction

Recommendations:

In the light of the study’s results, the researchers recommend:

1. Providing more attention to the manufacturing flexibility of Al-Manaseer concrete products plant. That shall enable the latter plant to raise its organizational performance, reduce costs, achieve a competitive advantage and ensure survival and growth in the business sector.
2. Providing more attention to the market share indicator. In addition, the researchers recommend providing more attention to customer satisfaction and meeting the customer demands. They recommend conducting similar studies about the methods of achieving customer satisfaction and meeting the customer demands.
3. Launching training programs for the employees working at Al-Manaseer concrete products plant. Such programs must improve those employees’ potentials and increase their expertise. That shall participate in raising the manufacturing flexibility level of the latter plant. Thus, it shall participate in raising the organizational performance level of the plant.

REFERENCES:


References written in English language


10. Sharma, Sushil; Jitpai boon, Thawatchai (2012), Comparative Study of Supply Chain Relationships, Mass Customization, and Organizational Performance between SME(s) and LE(s), Journal of Business Administration Research, Vol. 1, No. 2, P 139-156.