

## The Impact of Organizational Complexity on Organizational Performance: A Study on Industrial Companies in Egypt

### Author's Details:

<sup>(1)</sup>Prof. Dr. Wageeh A. Nafei- University of Sadat City, Menoufia, Egypt

<sup>(2)</sup>Prof. Dr. Abdulaziz S. Al-Angari- School of Business, Taif University, Saudi Arabia

### Abstract

*The objective of the research is to examine the impact of Organizational Complexity (OC) on Organizational Performance (OP). The research population consists of all employees at the industrial companies in Egypt. Due to time and cost constraints, the researcher adopted a sampling method to collect data for the study. The appropriate statistical methods were used to analyze the data and test the hypotheses.*

*The research has reached a number of results, the most important of which are: (1) OC is a negative variable in many previous studies. It creates problems that hinder the completion of tasks in various organizations (2) OC makes industrial companies in Egypt unable to develop strategies and processes to adapt to environmental changes, (3) The more complex industrial companies in Egypt, the less clear information and higher ambiguity are, (4) OC is the result of a complex behavior that has an impact on the performance, (5) OC is the lack of clarity of regulations and laws, the issuance of conflicting laws, or making changes on a continuous basis not considered in a period of time, (6) OC is the behavioral attitudes of workers in the industrial companies in Egypt, which are conflicting and uncontrollable as a result of human behavior that is difficult to identify in advance, (7) Most workers in the industrial companies in Egypt suffer from lack of time in the completion of the tasks assigned to them. (8) Most of the employees in the industrial companies in Egypt do not receive sufficient rewards. This leads to a state of behavioral complexity and frustration. (9) A large number of workers in the industrial companies in Egypt makes dealing with their needs very difficult and reduces the time available to develop their skills. (10) There is a negative relationship between OC and OP in the industrial companies in Egypt.*

*The research concluded that: (1) there should be support for the organizational performance dimensions of industrial companies in Egypt to minimize the negative impact of OC and establish training courses for workers to gain more experience. (2) Industrial companies in Egypt should be more independent to implement the decisions that are compatible with their environment. (3) There is a need to carry out future studies that seek to apply complex adaptive systems to meet the OC, which makes industrial companies in Egypt able to develop strategies and plans to overcome all obstacles, (4) Improving organizational performance has been and remains a complex problem in light of technological changes taking place in the surrounding environment. Therefore, the industrial companies in Egypt should be concerned with the subject of OC, since the current study showed that there is a fundamental relationship between OC and organizational performance. This can be achieved through the creation of databases to be easily accessible to all staff and to be continuously updated. (5) Few managers have a realistic understanding of how complexity affects industrial companies in Egypt. When managers realize that their employees face OC, they take direct steps to determine where complexity is to be addressed. (6) There is a need to pay attention to the elimination of OC through the training of workers in the industrial companies in Egypt on how to deal with OC, where these companies must have the ability to make a change to get rid of the chaotic situation it is going through.*

**Keywords:** Organizational Performance, Industrial Companies

### 1. Introduction

Organizational Complexity (OC) restricts the development of the organization's infrastructure. In addition, it increases risks and accidents in the workplace (Bickhard & Campbell, 2003; Forteza et al., 2017).

OC leads to loss of trust and cohesion among employees and weak organizational communication (Heide et al., 2018).

OC arises from the hierarchy, as in the overlapping industrial groups, OC makes organizations unable to develop strategies, structures and processes naturally to achieve adaptation to environmental changes. Successful organizations seek to create a special system of themselves, consisting of a set of tasks to achieve their goals (Gell-Mann, 2002; Pollack & Remington, 2012).

OC creates big problems that make it difficult to get things done in an organization. There are few managers who have a realistic understanding of how complexity affects an organization. When executives realize that their employees face OC, they take direct steps to determine where the complexity is to find out the cause of the problem, where complexity is caused by factors such as lack of clarity in the role or weakness of operations and knowing who is responsible for complexity then the organization begins to strengthen organizational activities by removing complexity by training staff on how to deal with OC. The organization must have the ability to make the change to get rid of its anarchic situation (Markusen, 2010).

Organizational Performance (OP) can be managed more effectively. There are a number of aspects that need to be taken into consideration: formulating an effective performance management framework and policy, understanding the functional activities of all employees, understanding the relationship between employee functions and organizational objectives, daily monitoring of employees' performance, disposal of things that hinder good performance, and reliance on teams of staff (Mishra & Sahoo, 2015).

After an extensive review of the different concepts of OP, it is clear that there is a large number of researches and studies on the subject of performance, although there was no agreement on a specific concept. In spite of the multiplicity and dimensions of the research hypotheses that dealt with it and the persistence of the institutions' managers with attention and emphasis on its various aspects, the performance remains a fertile field for research and study due to its close association with various variables and environmental factors, whether internal or external (Shahzad et al., 2012).

## **2. Literature Review**

### **2.1. Organizational Complexity**

#### **2.1.1. Organizational Complexity Concept**

The word "complexity" in administration and organization appeared before the second half of the 1980s, It was considered a modern science since it used the word complexity in natural science and chemistry since 1970 and the beginning of 1980. This was the expression of periodic random behavior resulting from a nonlinear equation based on the sensitivity of the system to the initial conditions. By the beginning of the 1990s, the word complexity appeared to indicate a new field in the study of the theory of the organization. There are three basic features of the complex system. They are (1) many independent factors interact with each other, (2) interactive system that can automatically direct the system to self-regulation, and (3) education through feedback (Frans et al., 2004; Crandall et al., 2010).

Complexity is many independent and interacting factors among them in a variety of ways. Complexity is an essential feature of the chaotic system, which is composed of a number of reactive components, The more complex the system becomes, the more predictable it can be (Frans et al., 2004).

There are five characteristics of a complex system. They are consciousness, connectivity, indeterminacy, emergence, and dissipation (Frans et al., 2004).

OC is a feature of the system and the term complexity means interlocking. It is an abstract and multidimensional term and all interact with each other in the light of a complex system (Schwandt, 2009).

OC consists of interactions between elements according to information available within the organization. OC is the result of complex behavior that has an impact on the functioning of the organization, where small disturbances have a significant impact on the entire system (Faucher et al., 2008).

The conflict between different cultures, if they exist in one place, increases the likelihood of OC (Van-Der, 2005).

The most important consequence of OC is that the system naturally appears in systems regardless of its simplicity or complexity. When the system is open, it receives energy from the outside and tends to create another system, and when the system is closed, it will reach the utmost chaos (Lewin, 1999).

The more complex the organizations are, the less clear and highly ambiguous, the information will be. Modern complexity theory holds that some systems with many interactions produce unpredictable behavior (Anderson, 1999).

Organizations are interconnected systems, so their members must understand them either by reducing their complexity (reducing the number of factors that influence their behavior) or by absorbing them (adopting a knowledge structure that simplifies inputs). Complex systems regulate themselves to deal with environmental changes (Anderson et al., 1999).

China is one of the largest social systems in the world. The historical factors contributed to the formation of this OC, which gave it different characteristics from what exists in Western industrialized countries. The organizations have dealt with OC through an assimilation strategy. Western companies operating in China face a choice between maintaining their standards of complexity or adopting a strategy to absorb complexity so that it is consistent with Chinese culture (Boisot & Child, 1999).

### 2.1.2. Types of Organizational Complexity

There are two types of OC. They are vertical complexity, which is the result of many different hierarchical levels, as well as horizontal complexity, which refers to the number of subdivisions in each section and the multiplicity of specialized units per level. (Fioretti & Visser, 2006).

There are several different types of OC (Birkinshaw & Heywood, 2010; Heaslip, 2015):

1. **Complexity due to regulations**, laws imposed and interventions by Non-governmental organizations that cannot be managed and controlled.
2. **The inherent complexity** which is an integral part of the work and can only be abandoned by leaving the part of the work.
3. **The complexity resulting** from where the organization operates, its implications, and how organizations can remove this type of complexity.
4. **Unnecessary complexity** due to the growing incompatibility between the needs of the organization and the processes that support it and can be easily managed once identified.
5. **The complexity based on human behavior**, where human behavior is unpredictable and uncontrollable, which makes the management of organizations more difficult and leads to complex problems.
6. **The complexity based on the behavior of the system**, which is the need for organizations to programs or components to interact dynamically with systems within the environment of the organization.
7. **Complexity based on ambiguity** is the result of not knowing what to expect or how to perceive and resulting in uncertainty about what will happen, and this kind of complexity is more difficult.

OC has been linked to its tangible reasons in order to facilitate the assignment of professional responsibilities to its departments (Heaslip, 2014):

1. **Operational complexity**: It is linked to the various activities in the organization. The management of operational complexity is the primary responsibility of the executive director. Operational complexity increases with the number of tasks that must be completed.
2. **The complexity of outputs**: It arises when an organization relies on unpredictable activities and management may be responsible because of their limited knowledge.
3. **Environmental complexity**: It arises because of the unstable environment in the period of operation of the organization and may be due to external reasons that can not be controlled.
4. **Stakeholder complexity**: It is caused by the owners of the organization in order to obtain support and the accompanying uncertainty in their decisions.
5. **OC**: It is linked to an attempt to harmonize views. The reason for the complexity is when organizations have to obtain the approval of many committees from several quarters for decision-making. Stakeholders or others may influence decision-making, which increases OC.

### 2.1.3. Organizational Complexity Dimensions

There are two dimensions of OC. They are (1) structural complexity (variety of elements and interdependencies between elements), and (2) experienced complexity (inefficient processes and unclear accountabilities). They are as follows (MacKenzie et al., 2005; Shaw & Gupta, 2004; Cara et al., 2017):

#### 1. Structural Complexity

**First: Variety of Elements:** It is a measure of the scope of activities the firm is involved with. Respondents were asked the following questions: (1) How many different direct customers you have across all operations and business units?, (2) How many products and services do you supply?, (3) How many different suppliers do you have?, (4) How many countries do you operate in?, (5) How many industries do you conduct business in?, (6) How many ways of making money-business models-there are in your organization?, (7) How many M&A has the company made in the last 15 years?, and (8) How many joint ventures and alliances has the company made in the last 15 years?

**Second Interdependencies between Elements:** It is the extent to which disparate parts of the firm are brought together for the purposes of decision making. Respondents were asked the following questions: (1) To what degree decisions require input from multiple business units within the company?, (2) To what extent does your organization use matrix structures, which force employees to respond simultaneously to multiple, potentially conflicting, decision premises?, (3) To what extent do senior managers in your company have multiple reporting lines?, and (4) To what extent does your company have multiple dimensions of equal importance at the top management level?

## **2.Experienced Complexity**

**First: Inefficient Processes:** It (experienced complexity) is horizontal arrangements in the organization that unintentionally make it more challenging for decision-makers to do their jobs effectively. Respondents were asked to rate the following statements: (1) Management processes are inefficient, unclear, and require more info, (2) Operating processes are inefficient, unclear, and require more info, (3) The company is not very integrated. Systems and processes are not interlinked, use different data and run on different timetables, and (4) The IT systems are ineffective; they are overly complex and do not keep pace with company development.

**Second: Unclear Accountabilities:** It (experienced complexity) is vertical arrangements in the organization that unintentionally make it more challenging for decision-makers to do their jobs effectively. Respondents were asked to rate the following statements: (1) Accountabilities are often shared in the company, so it is frequently unclear who is responsible for what; (2) There is significant duplication of activities across the organizations; (3) Target objectives are poorly defined; and (4) Financial rewards are not clearly tied to targets.

## **2.2. Organizational Performance**

### **2.2.1. Organizational Performance Concept**

OP is the outcome of the performance of all individuals and task forces for the various functions of the organization, so the success of the organization, in general, is greatly affected by the effort of these individuals (Carg & Rastogi, 2005).

OP is the ability of the organization to use its resources efficiently and produce outputs consistent with its objectives and relevance to its users (Peterson et al., 2003).

OP is a multidimensional perspective, which includes multiple performance indicators such as customer service and loyalty, and performance indicators related to goals such as return on investment and others (Agarwal et al., 2003).

OP is the sum of the outcomes of the activities and practices of the organization that are expected to correspond to planned and established objectives. OP is the achievement of the organization's goals. It has been identified in its mission by spending an acceptable level of organizational resources in order to achieve the goal of continuity and long-term survival of the Organization (Lusthaus, et al., 2002).

OP is the achievement, implementation, work, or performance of the individual, and performance is a behavioral indicator of the way individuals conduct their assigned duties within the organization (Armstrong, 2001).

OP is the ability of the organization to achieve its objectives through the efficient and effective use of its resources. In other words, OP is the outcome of all operations undertaken by the organization to achieve its objectives. Any imbalance in these processes will be reflected in the performance of the organization. Performance is the mirror of the organization (Daft, 2000).

OP is the extent to which the organization achieves its objectives and the extent to which the economy uses its scarce resources. Performance reflects the broader concept of the effectiveness of the organization. Performance often takes two forms: (1) financial performance, which focuses on the use of

simple outputs based on financial indicators of profit, return on investment and cash flow, (2) operational performance measured through sales indicators, market share and trends Customers and loyalty as well as other indicators (Hooley et al., 1998).

OP can be expressed in its simplest form as the desired outcomes of the organization (Wright et al., 1998).

OP expresses the extent to which the interaction between inputs and outputs is measured (Stannack, 1996).

OP is a reflection of how the organization uses its resources and invests them so that they can achieve their goals (Wright et al., 1996). OP is the organization's ability to achieve its long-term goals efficiently and effectively (Robins & Wiersema, 1995).

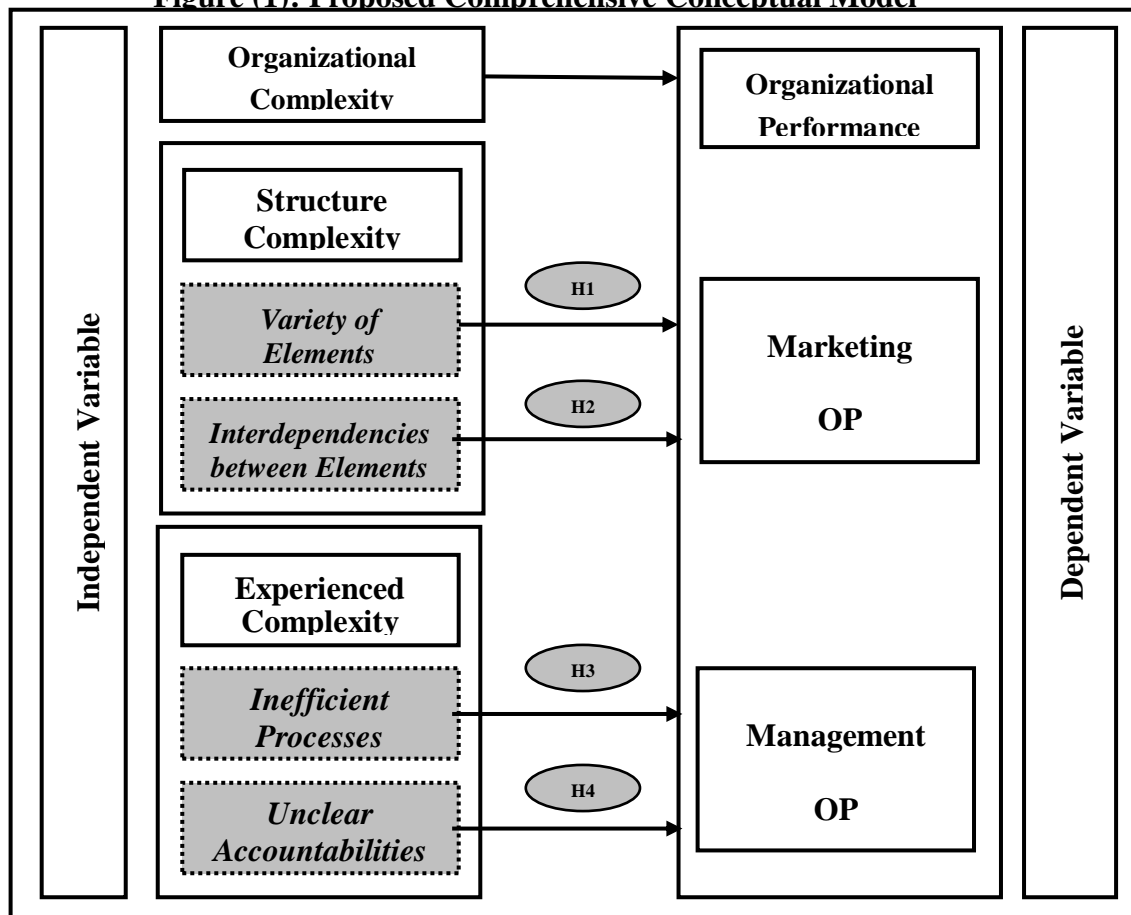
In light of the above, it can be said that OP is an integrated system based on the ability of the organization to use all its technological, administrative, cultural and marketing resources to achieve its objectives efficiently and effectively. Research will depend on the use of this concept as it covers the four dimensions of OP.

### 2.2.2. Organizational Performance Dimensions

OP has been classified into four dimensions: (1) marketing OP, which relates to the nature of the relationship with the market, wholesalers and retailers, customers, volume of sales and purchases, marketing strategies, distribution channels, and marketing mix, (2) management OP, a series of processes related to management in the organization (Li, et al., 2004).

### 3. Research Model

Figure (1): Proposed Comprehensive Conceptual Model



The diagram shows that there is one independent variable of OC. There is one dependent variable of OP. It shows the rational link between the two types of observed variables. The research framework suggests that OC has an impact on OP.

OC is measured in terms of (1) structural complexity (variety of elements and interdependencies between elements) and (2) experienced complexity (inefficient processes and unclear accountabilities) (MacKenzie et al., 2005; Shaw & Gupta, 2004; Cara et al., 2017).

OP is measured in terms of marketing organizational performance and organizational management performance (Li, et al., 2004).

#### 4. Research Questions

The researcher found the research problem through two sources. The first source is to be found in previous studies. There is a lack in the number of literature review that dealt with the analysis of the relationship between OC and OP. This called for the researcher to test this relationship in the Egyptian environment.

The second source is the pilot study, which was conducted in an interview with (30) employees at the industrial companies in Egypt to identify the dimensions of OC and OP. The researcher found through the pilot study several indicators notably the blurred important and vital role that could be played by OC in affecting OP at the industrial companies in Egypt. The research questions of this study are as follows:

- Q1: What is the nature and extent of the relationship between OC (Variety of Elements) and OP at the industrial companies at Sadat city in Egypt?
- Q2: What is the extent of the relationship between OC (Interdependencies between Elements) and OP at the industrial companies at Sadat city in Egypt?
- Q3: What is the nature of the relationship between OC (Inefficient Processes) and OP at the industrial companies at Sadat city in Egypt?
- Q4: What is the extent of the relationship between OC (Unclear Accountabilities) and OP at the industrial companies at Sadat city in Egypt?

#### 5. Research Hypotheses

The following hypotheses were developed to decide if there is a significant correlation between OC and OP.

- H1: There is no relationship between OC (Variety of Elements) and OP at the industrial companies at Sadat city in Egypt.
- H2: OC (Interdependencies between Elements) has no statistically significant effect on OP at the industrial companies at Sadat city in Egypt.
- H3: There is no relationship between OC (Inefficient Processes) and OP at the industrial companies at Sadat city in Egypt.
- H4: There is no relationship between OC (Unclear Accountabilities) and OP at the industrial companies at Sadat city in Egypt.

#### 6. Research Population and Sample

The population of the study included all employees at the industrial companies in Sadat city in Egypt. The total population is 11550 employees. Determination of respondent sample size was calculated using the formula (Daniel, 1999) as follows:

$$n = \frac{N \times (Z)^2 \times P(1-P)}{d^2(N-1) + (Z)^2 \times P(1-P)}$$

The number of samples obtained by 377 employees at the industrial companies in Sadat city in Egypt is presented in Table (1).

**Table (1) Distribution of the Sample Size**

| Industrial Companies          | Employees    | Percentage  | Sample Size            |
|-------------------------------|--------------|-------------|------------------------|
| 1. Iron and Steel Sector      | 8100         | 40%         | 377X 40% = 150         |
| 2. Construction Sector        | 5926         | 29%         | 377X 29% = 110         |
| 3. Food Industries Sector     | 2087         | 10%         | 377X 10% = 38          |
| 4. Textile Sector             | 2520         | 13%         | 377X 13% = 49          |
| 5. Chemical Industries Sector | 1567         | 8%          | 377X 8% = 30           |
| <b>Total</b>                  | <b>20200</b> | <b>100%</b> | <b>377X 100% = 377</b> |

Source: Personnel Department at Industrial Companies, Sadat City, Egypt, 2018

**Table (2) Characteristics of the Sample**

| Demographic Variables   |                   | Frequency  | Percentage  |
|-------------------------|-------------------|------------|-------------|
| 1- Sex                  | Male              | 225        | 75%         |
|                         | Female            | 75         | 25%         |
|                         | <b>Total</b>      | <b>300</b> | <b>100%</b> |
| 2- Marital Status       | Single            | 125        | 42%         |
|                         | Married           | 175        | 58%         |
|                         | <b>Total</b>      | <b>300</b> | <b>100%</b> |
| 3- Age                  | Under 30          | 100        | 33%         |
|                         | From 30 to 45     | 150        | 50%         |
|                         | Above 45          | 50         | 17%         |
|                         | <b>Total</b>      | <b>300</b> | <b>100%</b> |
| 4- Educational Level    | Secondary school  | 100        | 33%         |
|                         | University        | 150        | 50%         |
|                         | Post Graduate     | 50         | 17%         |
|                         | <b>Total</b>      | <b>300</b> | <b>100%</b> |
| 5- Period of Experience | Less than 5 years | 60         | 20%         |
|                         | From 5 to 10      | 200        | 67%         |
|                         | More than 10      | 40         | 13%         |
|                         | <b>Total</b>      | <b>300</b> | <b>100%</b> |

Source: The researcher based on the outputs of SPSS, V.23, 2015

## 7. Procedure

The goal of this study was to identify the significant role of OC in affecting OP. A survey research method was used to collect data. The questionnaire included three questions relating to OC, OP, and biographical information of employees at industrial companies at Sadat city in Egypt. About 377 survey questionnaires were distributed. Multiple follow-ups yielded 300 statistically usable questionnaires. Survey responses were 79.5%.

## 8. Research Variables and Methods of Measuring

The 20-item scale OC section is based on MacKenzie et al., 2005; Shaw & Gupta, 2004; Cara et al., 2017. There were twelve items measuring structural complexity (eight items for measuring a variety of elements, and four items for measuring interdependencies between elements). Also, eight items measuring experienced complexity (four items for measuring inefficient processes, and four items for measuring unclear accountabilities).

To ensure that these items were weighted approximately equally, each question had a range of possible answers arranged on a five-point scale. As above, we conceptualize interdependencies as a formative construct, in that different firms will typically use different mechanisms for building interdependencies between elements, so we would not expect uniformly high or low scores on these questions.

The 16-item scale OP section is based on Li et al., 2004. There were ten items measuring management OP and six items measuring marketing OP.

Responses to all items scales were anchored on a five (5) point Likert scale for each statement which ranges from (5) “full agreement,” (4) for “agree,” (3) for “neutral,” (2) for “disagree,” and (1) for “full disagreement”.

## 9. Data Analysis and Hypotheses Testing

### 9.1. Coding of Variables

The research consists of two main variables. The first is OC (independent variable). The second is OP (dependent variable). Each variable consists of sub-variables. The main variables, sub-variables, number of the statement, and methods of measuring variables can be explained in the following table:

**Table (3): Description and Measuring of the Research Variables**

| Main Variables             | Sub-Variables          |                                    | Number of Statement | Methods of Measuring Variables                                |
|----------------------------|------------------------|------------------------------------|---------------------|---|
| Organizational Complexity  | Structural Complexity  | Variety of Elements                | 8                   | MacKenzie et al., 2005; Shaw & Gupta, 2004; Cara et al., 2017 |
|                            |                        | Interdependencies between Elements | 4                   |   |
|                            | Experienced Complexity | Inefficient Processes              | 4                   |   |
|                            |                        | Unclear Accountabilities           | 4                   |   |
|                            |                        | <b>Total OC</b>                    | <b>20</b>           |   |
| Organizational Performance | Management OP          | 10                                 | Li et al., 2004     |   |
|                            | Marketing OP           | 6                                  |                     |   |
|                            | <b>Total OP</b>        | <b>16</b>                          |                     |   |

## 9.2. Descriptive Analysis

Before testing the hypotheses and research questions, descriptive statistics were performed to find out means and standard deviations of OC and OP.

**Table (4) shows the mean and standard deviations of OC and OP**

| Variables                  | Sub Variables            | The Dimension                      | Mean         | Standard Deviation |
|----------------------------|--------------------------|------------------------------------|--------------|--------------------|
| OC                         | Structural Complexity    | Variety of Elements                | 2.87         | 1.01               |
|                            |                          | Interdependencies between Elements | 2.98         | 1.01               |
|                            | Experienced Complexity   | Inefficient Processes              | 3.17         | 0.924              |
|                            |                          | Unclear Accountabilities           | 3.18         | 0.987              |
|                            |                          | <b>Total Measurement</b>           | <b>3.01</b>  | <b>0.879</b>       |
| Organizational Performance | Management OP            | 3.46                               | 0.674        |                    |
|                            | Marketing OP             | 3.61                               | 0.876        |                    |
|                            | <b>Total Measurement</b> | <b>3.52</b>                        | <b>0.655</b> |                    |

Source: The researcher based on the outputs of SPSS, V.23, 2015

According to Table (4), among the various facets of OC, most of the respondents identified the presence of variety of elements (M=2.87, SD=1.01), interdependencies between elements (M= 2.98, SD=1.01), inefficient processes (M=3.17, SD=0.924) and unclear accountabilities (M=3.18, SD=0.987), total OC (M=3.01, SD=0.879).

The second issue examined was the different facets of OP (management OP and marketing OP). Most of the respondents identified the presence of management OP (M=3.46, SD=0.674), and marketing OP (M=3.61, SD=0.876), total OP (M=3.52, SD=0.655).

## 9.3. Evaluating Reliability

Data analysis was conducted. All scales were first subjected to reliability analysis. ACC was used to assess the reliability of the scales. Item analysis indicated that dropping any item from the scales would not significantly raise the alphas.

**Table (5) Reliability of OC and OP**

| Variables                      | Sub Variables                  | Dimension                           | Number of Statement | ACC          |
|--------------------------------|--------------------------------|-------------------------------------|---------------------|--------------|
| OC                             | Structural Complexity          | Variety of Elements                 | 8                   | 0.897        |
|                                |                                | Interdependencies between Elements  | 4                   | 0.781        |
|                                |                                | <b>Total Structural Complexity</b>  | <b>12</b>           | <b>0.933</b> |
|                                | Experienced Complexity         | Inefficient Processes               | 4                   | 0.667        |
|                                |                                | Unclear Accountabilities            | 4                   | 0.707        |
|                                |                                | <b>Total Experienced Complexity</b> | <b>8</b>            | <b>0.837</b> |
| <b>Total Measurement of OC</b> |                                | <b>20</b>                           | <b>0.933</b>        |              |
| OP                             | Management OP                  | 10                                  | 0.766               |              |
|                                | Marketing OP                   | 6                                   | 0.856               |              |
|                                | <b>Total Measurement of OP</b> | <b>16</b>                           | <b>0.853</b>        |              |

Source: The researcher based on the outputs of SPSS, V.23, 2015

To assess the reliability of the data, Cronbach's Alpha test was conducted. Table (5) shows the reliability results for OC and OP. All items had alphas above 0.70 and were therefore excellent, according to Langdridge's (2004) criteria.

Table (5) presents the reliability of OC. The reliabilities of a variety of elements, interdependencies between elements, inefficient processes, unclear accountabilities are generally higher. The 12 items of OC are reliable because the Cronbach's Alpha is 0.933. A variety of elements, which consists of 8 items, is



reliable because the Cronbach’s Alpha is 0.897. The 4 items related to interdependencies between elements are reliable because the Cronbach’s Alpha is 0.781, while the 4 items of inefficient processes are reliable because the Cronbach’s Alpha is 0.667. The 4 items related to unclear accountabilities are reliable because the Cronbach’s Alpha is 0.707. Thus, the internal consistency of OC can be acceptable.

The 16 items of OP are reliable because the Cronbach’s Alpha is 0.853. The management OP, which consists of 10 items, is reliable because the Cronbach’s Alpha is 0.766. The 6 items related to marketing OP are reliable because the Cronbach’s Alpha is 0.856. Thus, the internal consistency of OP can be acceptable.

Accordingly, three scales were defined, OC (20 variables), where Cronbach’s Alpha represented about 0.936, and OP (16 variables), where Cronbach’s Alpha represented 0.945.

**9.4. The Means, St. Deviations and Correlation among Variables**

**Table (6) Means, Standard Deviations and Intercorrelations among Variables**

| Variables                  | Mean | Std. Deviation | OC     | OP |
|----------------------------|------|----------------|--------|----|
| Organizational Complexity  | 3.01 | 0.879          | 1      |    |
| Organizational Performance | 3.52 | 0.655          | 0.127* | 1  |

Source: The researcher based on the outputs of SPSS, V.23, 2015

Table (6) shows correlation coefficients between the research variables, and results indicate the presence of a significant correlation between variables (OC and OP). The level of OC is high (Mean=3.01; SD=0.879), while OP is (Mean=3.52; SD= 0.655). Also, Table (6) reveals the correlation between OC and OP (R=0.127; P <0.01), which means that the high level of OC leads to lower OP.

**9.5. The Correlation between OC and OP**

The relationship between OC and OP at the industrial companies in Sadat city in Egypt is presented in the following table:

**Table (7) Correlation Matrix between OC and OP**

| Research Variables                 | 1       | 2       | 3       | 4       | 5 |
|------------------------------------|---------|---------|---------|---------|---|
| Variety of Elements                | 1       |         |         |         |   |
| Interdependencies between Elements | 0.946** | 1       |         |         |   |
| Inefficient Processes              | 0.547** | 0.590** | 1       |         |   |
| Unclear Accountabilities           | 0.612** | 0.710** | 0.807** | 1       |   |
| Organizational Performance         | 0.163** | 0.113** | 0.112** | 0.009** | 1 |

Note: \*\* Correlation is significant at 0.01 level.

Source: The researcher based on the outputs of SPSS, V.23, 2015

Based on the Table (7), the correlation between OC (variety of elements) and OP is 0.163. For OC (interdependencies between elements) and OP, the value is 0.113 whereas OC (inefficient processes) and OP show a correlation value of 0.112. Also, the correlation between OC (unclear accountabilities) and OP is 0.009. The overall correlation between OC and OP is 0.127.

**9.5.1. Structural Complexity (Variety of Elements) and OP**

The relationship between OC (Variety of Elements) and OP is determined. The first hypothesis to be tested is:

**H1: There is no relationship between OC (Variety of Elements) and OP at the industrial companies in Sadat city in Egypt**

**Table (8) MRA Results for OC (Variety of Elements) and OP**

| The Variables of<br>OC (Variety of Elements)   | Beta   | R      | R <sup>2</sup> |
|--|--------|--------|----------------|
| 1. How many different direct customers you have across all operations and business units?  | 3.60** | 0.066  | 0.004          |
| 2. How many products and services do you supply?   | 1.22   | 0.156  | 0.024          |
| 3. How many different suppliers do you have?   | 1.70*  | 0.251  | 0.063          |
| 4. How many countries do you operate in?   | 1.83*  | 0.228  | 0.052          |
| 5. How many industries do you conduct business in?   | 3.61** | 0.047  | 0.002          |
| 6. How many ways of making money-business models-there are in your organization?   | 2.12*  | 0.014  | 0.002          |
| 7. How many M&A has the company made in the last 15 years?   | 1.03   | 0.150  | 0.023          |
| 8. How many joint ventures and alliances has the company made in the last 15 years?  | 1.05   | 0.069  | 0.004          |
| <ul style="list-style-type: none"> <li>▪ MCC</li> <li>▪ DC</li> <li>▪ Calculated F</li> <li>▪ Degree of Freedom</li> <li>▪ Indexed F</li> <li>▪ Level of Significance</li> </ul> |        | 0.361  |                |
|  |        | 0.130  |                |
|  |        | 5.438  |                |
|  |        | 8, 291 |                |
|  |        | 2.51   |                |
|  |        | 0.000  |                |

\*\* P < .01

Source: The researcher based on the outputs of SPSS, V.23, 2015

As Table (8) proves, the MRA resulted in the R of 0.361 demonstrating that the 8 independent variables of OC (variety of elements) construe OP significantly. Furthermore, the value of R square, 8 independent variables of OC (variety of elements), can explain 0.13% of the total factors at the OP level. Hence, 87% is explained by the other factors. Therefore, there is enough empirical evidence to reject the null hypothesis.

### 9.5.2. Structural Complexity (Interdependencies between Elements) and OP

The relationship between OC (Interdependencies between Elements) and OP is determined. The second hypothesis to be tested is:

**H2: OC (Interdependencies between Elements) has no significant effect on OP at industrial companies at Sadat city in Egypt.**

**Table (9) MRA Results for OC (Interdependencies between Elements) and OP**

| The Variables of<br>OC (Interdependencies between Elements)  | Beta   | R      | R <sup>2</sup> |
|--|--------|--------|----------------|
| 1. To what degree decisions require input from multiple business units within the company?   | 0.607  | 0.066  | 0.004          |
| 2. To what extent does your organization use matrix structures, which force employees to respond simultaneously to multiple, potentially conflicting decision premises?          | 3.12** | 0.150  | 0.023          |
| 3. To what extent do senior managers in your company have multiple reporting lines?  | 1.77*  | 0.069  | 0.004          |
| 4. To what extent does your company have multiple dimensions of equal importance at the top management level?  | 1.02   | 0.057  | 0.003          |
| <ul style="list-style-type: none"> <li>▪ MCC</li> <li>▪ DC</li> <li>▪ Calculated F</li> <li>▪ Degree of Freedom</li> <li>▪ Indexed F</li> <li>▪ Level of Significance</li> </ul> |        | 0.198  |                |
|  |        | 0.039  |                |
|  |        | 2.99   |                |
|  |        | 4, 295 |                |
|  |        | 3.31   |                |
|  |        | 0.000  |                |

Source: The researcher based on the outputs of SPSS, V.23, 2015

As Table (9) proves, the MRA resulted in the R of 0. 0.198. This means that OP has been significantly explained by the 4 independent variables of OC (Interdependencies between Elements). As a result of the value of R<sup>2</sup>, the four independent variables of OC (Interdependencies between Elements) justified only 3% of the total factors in OP level. Hence, 97% is explained by the other factors. Therefore, there is enough empirical evidence to reject the null hypothesis.

### 9.5.3. Experienced Complexity (Inefficient Processes) and OP

The relationship between OC (**Inefficient Processes**) and OP is determined. The third hypothesis to be tested is:

**H3: There is no relationship between OM (Inefficient Processes) and OP at the industrial companies in Sadat city in Egypt**

As Table (10) proves, the MRA resulted in the R of 0.327 demonstrating that the 4 independent variables of OC (Inefficient Processes) construe OP significantly. Furthermore, the value of R square, 4 independent variables of OC (Inefficient Processes), can explain 0.11% of the total factors at the OP level. Hence, 89% is explained by the other factors. Therefore, there is enough empirical evidence to reject the null hypothesis.

**Table (10) MRA Results for OC (Inefficient Processes) and OP**

| The Variables of OC (Inefficient Processes)  | Beta    | R   | R <sup>2</sup> |
|--|---------|---|----------------|
| 1. Management processes are inefficient, unclear, and require more info.   | 0.632   | 0.093   | 0.008          |
| 2. Operating processes are inefficient, unclear, and require more info.  | 0.007** | 0.175   | 0.030          |
| 3. The company is not very integrated. Systems and processes are not interlinked, use different data and run on different timetables.  | 0.273   | 0.108   | 0.012          |
| 4. The IT systems are ineffective; they are overly complex and do not keep pace with company development.  | 0.024*  | 0.063   | 0.004          |
| <ul style="list-style-type: none"> <li>▪ MCC</li> <li>▪ DC</li> <li>▪ Calculated F</li> <li>▪ Degree of Freedom</li> <li>▪ Indexed F</li> <li>▪ Level of Significance</li> </ul> |         | 0.224<br>0.050<br>3.89<br>4, 295<br>3.31<br>0.000 |                |
| ** P < .01   |         |   |                |

Source: The researcher based on the outputs of SPSS, V.23, 2015

**9.5.4. Experienced Complexity (Unclear Accountabilities) and OP**

The relationship between OC (Unclear Accountabilities) and OP is determined. The fourth hypothesis to be tested is:

**H4: OC (Unclear Accountabilities) has no significant effect on OP at industrial companies at Sadat city in Egypt.**

**Table (11) MRA Results for OC (Unclear Accountabilities) and OP**

| The Variables of OC (Unclear Accountabilities)   | Beta   | R  | R <sup>2</sup> |
|--|--------|--|----------------|
| 1. Accountabilities are often shared in the company, so it is frequently unclear who is responsible for what;  | 0.932  | 0.093  | 0.008          |
| 2. There is significant duplication of activities across the organizations;  | 3.26** | 0.175  | 0.030          |
| 3. Target objectives are poorly defined;   | 1.30   | 0.116  | 0.013          |
| 4. Financial rewards are not clearly tied to targets.  | 1.59   | 0.124  | 0.015          |
| <ul style="list-style-type: none"> <li>▪ MCC</li> <li>▪ DC</li> <li>▪ Calculated F</li> <li>▪ Degree of Freedom</li> <li>▪ Indexed F</li> <li>▪ Level of Significance</li> </ul> |        | 0.265<br>0.070<br>5.571<br>4, 295<br>3.31<br>0.000 |                |

Source: The researcher based on the outputs of SPSS, V.23, 2015

As Table (11) proves, the MRA resulted in the R of 0. 0.265. This means that OP has been significantly explained by the 4 independent variables of OC (Unclear Accountabilities). As a result of the value of R<sup>2</sup>, the four independent variables of OC (Unclear Accountabilities) justified only 7% of the total factors at OP level. Hence, 93% is explained by the other factors. Therefore, there is enough empirical evidence to reject the null hypothesis.

**10. Research Results**

By reviewing the results of testing the research hypothesis, the study reached a set of results which will be reviewed and discussed as follows:

1. OC at the industrial companies in Egypt is a negative variable in many previous studies. It creates problems that hinder the completion of tasks in various organizations, including industrial companies in Egypt. This makes the environment chaotic and unclear.
2. OC at the industrial companies in Egypt makes industrial companies in Egypt unable to develop strategies and processes naturally in order to adapt to environmental changes.
3. The more complex industrial companies in Egypt, the less clear information and higher ambiguity we have, such as industrial companies in Egypt, which leads to unpredictable behavior.
4. OC at the industrial companies in Egypt is the result of complex behavior that has an impact on the organizational performance. OC also creates significant problems that make it difficult to accomplish different tasks in these companies.
5. One of the reasons that lead to the OC at the industrial companies in Egypt is the lack of clarity of regulations and laws, or the issuance of conflicting laws, or make changes on a continuous basis and not considered in a period of time, which leads to the entry of industrial companies in Egypt in a state of incompatibility With their environment.
6. One of the reasons leading to OC at the industrial companies in Egypt is the behavioral attitudes of workers in the industrial companies in Egypt, which are conflicting and uncontrollable as a result of human behavior that is difficult to identify in advance.
7. Most workers in the industrial companies in Egypt suffer from lack of time in the completion of the tasks assigned to them, which causes them in the mistakes during work or officials require employees to perform tasks inconsistent with what is established in the administrative regulations.
8. Most of the workers at the industrial companies in Egypt do not receive sufficient rewards. Some of the directives are ambiguous and incomprehensible. This leads to a state of behavioral complexity and frustration.
9. Another factor that leads to the regulatory complexity at the industrial companies in Egypt is that some decisions have different interpretations. When mistakes are made, corrective paths are not developed quickly. If these correct paths are placed, they are not retained for similar cases in the future.
10. A large number of employees at the industrial companies in Egypt makes dealing with their needs very difficult and reduces the time available to develop their skills. They get busy with much work and maybe the most routine, and thus increase the complexity and less effective performance.
11. There is a negative relationship between OC and OP at the industrial companies in Egypt. OC has adversely affected marketing organizational performance. Also, OC adversely affected administrative, organizational performance.
12. OC restricts the development of the infrastructure at the industrial companies in Egypt. In addition, it increases the risk and accidents in the workplace, which leads to loss of trust and cohesion between employees and weak organizational communications.

## 11. Recommendations

In the light of the previous results, the researcher concluded with a set of recommendations summarized as follows:

1. There should be support for the organizational performance dimensions of industrial companies in Egypt to minimize the negative impact of OC and establish training courses for workers to gain more experience. There should be serious work to build an internal intranet network so that all sections are connected to be speed in the transfer of information reliably and in this case, will strengthen information justice and reduce the impact of OC on the work environment.
2. Industrial companies in Egypt should be more independent to implement the decisions that are compatible with their environment. Therefore, the industrial companies in Egypt have to adapt to the state of complexity and achieve a state of balance so that they can reduce the impact of factors that lead to OC by activating and supporting the marketing and administrative performance in the industrial companies in Egypt.
3. The need to carry out future studies that seek to apply complex adaptive systems to meet the OC, which makes industrial companies in Egypt able to develop strategies and plans to overcome all obstacles.

4. Improving organizational performance has been and remains a complex problem in light of technological changes taking place in the surrounding environment. Therefore, the industrial companies in Egypt should be concerned with the subject of OC, since the current study showed that there is a fundamental relationship between OC and organizational performance. This can be achieved through the creation of databases to be easily accessible to all staff and to be continuously updated.
5. Few managers have a realistic understanding of how complexity affects industrial companies in Egypt. When managers realize that their employees face OC, they take direct steps to determine where complexity is to be addressed.
6. There is a need to pay attention to the elimination of OC through the training of workers in the industrial companies in Egypt on how to deal with OC. These companies must have the ability to make changes to get rid of the chaotic situation it is going through.

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