

# The Impact of Business Intelligence Applications on Achieving Total Quality in the Arab Center Company for Pharmaceutical and Chemical Industries in Jordan

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The current study aimed to identify the impact of business intelligence applications on achieving comprehensive quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan, in relation to the dimensions of study — productive knowledge management applications, decision support applications, technological applications — in addition to detecting differences according to the variable of the job title. The researcher used the questionnaire as a tool for the study, and the study sample consisted of 94 workers in the company. The descriptive analytical approach was applied, and the study reached a set of results according to which there is a clear impact of business intelligence applications in achieving comprehensive quality. Also, it turns out that there are no statistically significant differences between the sample responses, according to the variable of job title.

**Keywords:** *Business intelligence, Total quality.*

## Introduction

Opening to advanced technology is a challenge for every organisation looking for excellence in the global competition market, and to achieve excellence, institutions must rely on administrative systems and approaches that allow them to keep pace with changes, and the most important and recent business intelligence systems. Where the concept of business intelligence is considered a modern concept in economics and management, this concept depends on information systems in economic institutions (Hazawi, 2016).

It is worth noting that the employment of business intelligence is considered one of the priorities of professionals and researchers in the administration. This is the result of the fact that it affects future directions and strategic decisions of institutions, in order to improve their performance and rationalise their decisions by adopting the latest economic and administrative theories and ideas, including business intelligence, which is an important input to ensure the accurate and timely arrival of appropriate information (Al-Sakarna, 2018). This naturally contributes to the sound engineering of decisions that will strengthen the institution's general, and competitive positions in the market, and ensure that its various and diverse resources are well utilised (Maani et al., 2016). In addition, making its future strategies and policies more flexible and responsive to changes in its public, and private environment (Fraser, 2011).

It should be noted that the financial and administrative development in the system of business companies led to the search for ways and mechanisms that contribute to improving the evaluation process, and achieving comprehensive quality in their various departments (Khan & Wahab, 2010). One of these methods that business organisations in general, and the industrial sectors in particular have begun to employ, is known as business intelligence applications (Fu et al., 2016). The function of business intelligence applications is one of the important jobs in organisations due to the multiplicity of their activities, the increase in the volume of business, and the increase in competition between organisations (Ambad & Wahab, 2016). As business intelligence is based on the principle of using modern technologies and applications, the Arab Center for Pharmaceutical and Chemical Industries in Jordan has started to adopt business intelligence applications to control the quality of internal audits, in order to reach a better level of performance (Amin et al., 2016).

On the other hand, the Arab Center for Pharmaceutical and Chemical Industries in Jordan is considered similar to the rest of the economic sectors that seek to control the quality of internal audits, in their effort to achieve total quality by employing business intelligence applications (Ertymeh, 2013). This company is also considered one of the main sectors in the Jordanian national economy, and this economic sector receives great support from the Jordanian Government, which has taken a number of measures to advance this sector towards achieving excellence, and creativity (Ahmed, 2012).

Based on the foregoing, the research on knowing the impact of business intelligence applications on achieving comprehensive quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan has its justifications. These are in accordance with international standards adopted by international companies, and what is presented on the field of technology in terms of progress and development in the quality of services to achieve a competitive advantage. Among those justifications is that the outputs of the Arab Center for

Pharmaceutical and Chemical Industries in Jordan, such as quality, are able to prove their presence in the local, and international markets.

### **Problem of the Study**

Total quality management in economic companies is an essential input to face the challenges posed by international changes, and it has become the primary stage in organisational change processes. Therefore, many institutions seek to pursue them, and this can only be achieved through the creation of radical changes, most notably the employment of business intelligence applications (Dayal et al., 2016). In addition to the change in the corporate structure, and in proportion to the applications of business intelligence, this naturally guarantees economic companies the ability to compete in the international, and local markets and guarantees them survival, continuity, and growth (Westerland, 2008).

Accordingly, the sector of the Arab Center for Pharmaceutical and Chemical Industries in Jordan is increasing in importance, along with other economic sectors, in terms of operating the Jordanian national labour, and supporting the Jordanian economy. Moreover, the Arab Center for Pharmaceutical and Chemical Industries urgently needs to develop its working methods and its mechanisms to commensurate with the technical developments related to business intelligence applications, which necessitated conducting this study in an attempt to reveal the impact of business intelligence applications on achieving comprehensive quality in the Arab Center for Pharmaceutical and Chemical Industries.

In this context, it has become obligatory for the Arab Center for Pharmaceutical and Chemical Industries in Jordan to adopt business intelligence applications in its management, and work in the local, and global markets, in order to stoke the spirit of positive competition to achieve total quality among other companies. Accordingly, the current study sought to answer the following and primary question:

What is the impact of business intelligence applications on achieving total quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan?

### **Questions of the Study**

The main question of the study problem subdivides into the following sub-questions:

1. What is the impact of business intelligence applications on achieving total quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan, in relation to the dimensions of the study, being productive knowledge management applications, decision support applications, and technological application?

2. Are there statistically significant differences at the level of significance (0.05) between the responses of workers at the Arab Center for Pharmaceutical and Chemical Industries in Jordan about the impact of business intelligence applications on achieving overall quality, which are attributable to the study variable of job title?
3. Is there a statistically significant effect at the significance level (0.05) for business intelligence applications in achieving overall quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan?

### **Objectives of the Study**

1. Identifying the impact of business intelligence applications on achieving total quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan, in relation to the dimensions of the study (productive knowledge management applications, decision support applications, technological application).
2. Identifying whether there are statistically significant differences at the level of significance (0.05) between the responses of workers at the Arab Center for Pharmaceutical and Chemical Industries in Jordan about the impact of business intelligence applications on achieving overall quality, which are attributable to the study variable (job title).
3. Identifying whether there is a statistically significant effect at the significance level (0.05) for business intelligence applications in achieving overall quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan.

### **The Study Significance**

The importance of the study stems from the pioneering characteristics of the Arab Center for Pharmaceutical and Chemical Industries in Jordan through achieving the high-quality products at the level of other companies in Jordan. Moreover, the importance of the study begins by shedding light on the practical applications carried out by the company related to productive knowledge management applications, decision support applications, and technological application.

### **Terms of the Study**

**Business intelligence:** is known as containing tools, databases, data warehouses, and performance management methodologies, all integrated into standardised software that serves corporate goals (Al-Otaibi, 2015).

**Total quality:** is defined as administrative processes related to planning and organising, achieving consumer requirements, obtaining customer evaluations of the product, working to continuously improve product quality, and reaching accurate and highly efficient specifications (Erteem, 2013).

**Arab Center Company for Pharmaceutical and Chemical Industries:** is a pharmaceutical industrial company known as the Arab Drug Center and has been listed on the Amman Stock Exchange since October 2003. It operates in the pharmaceuticals, biotechnology, and life sciences sector with a focus on medicines.

### **Delimitations of the Study**

The study is limited to identifying the impact of business intelligence applications on achieving comprehensive quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan. The impact was revealed through a field study that discussed the following dimensions of productive knowledge management applications, decision support applications, and technological applications, and it will be applied in the Hashemite Kingdom of Jordan, represented by the Arab Center for Pharmaceutical and Chemical Industries on workers in the company during the year 2019.

### **The Field Study**

#### **Method of the Study**

The descriptive-analytical approach was adopted in this study, which is limited to the collection of data and facts, and then the processes of classifying and categorising them.

### **Population**

The study population consisted of employees in the Arab Center company for Pharmaceutical and Chemical Industries in Jordan through a purposive sample of 94 employees. The following Table 1 clarifies the sample distribution.

**Table 1:** The Sample Distribution

<b>Variables</b>	<b>Percentage</b>	<b>Frequency</b>
<b>Job Title</b>		
Director General	1.06%	1
Director of the Department	11.70%	11
Head of the Department	18.08%	17
Employees	69.16%	65

### ***Instruments***

To achieve the objectives of the study, the researcher prepared a questionnaire that included three dimensions of productive knowledge management applications, decision support applications, and technological applications, which measured the impact of business intelligence on achieving overall quality. The questionnaire consisted of 15 items.

### ***Internal Consistency Validity***

The validity of the questionnaire was confirmed by the method of validity of internal consistency, and the following table clarifies the procedures for calculating the validity of internal consistency.

**Table 2:** Pearson correlation coefficients of the questionnaire dimensions

<b>Dimensions</b>	<b>Correlation coefficients</b>	<b>Sig.(2- tailed)</b>
Productive knowledge management applications	0.682**	0.000
Decision support applications	0.705**	0.000
Technological Applications	0.699**	0.000

The Table 2 shows that the correlation coefficients are at a high level and are statistically significant at the level of 0.000. This indicates that the scale of the study has a high validity of internal consistency.

### ***Reliability***

To verify the stability of the scale, the researcher used Cronbach's alpha equation, as shown in the following table:

**Table 3:** Cronbach's Alpha coefficients of the questionnaire dimensions

<b>Dimensions</b>	<b>Cronbach's Alpha</b>
Productive knowledge management applications	0.629
Decision support applications	0.703
Technological Applications	0.737
<b>Total reliability Coefficient</b>	<b>0.797</b>

The Table 3 shows that the Cronbach's alpha coefficients of the questionnaire's reliability reached 0.797, which is a high coefficient of reliability.

## Discussion

**The First Question:** what is the impact of business intelligence applications on achieving total quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan, in relation to the dimensions of the study of productive knowledge management applications, decision support applications, and technological application?

### *The First Dimension: Productive Knowledge Management Applications*

The means and standard deviations of the sample's responses were calculated for each of the productive knowledge management applications dimension items, in descending order. The following table illustrates this.

**Table 4:** Means and standard deviations of the productive knowledge management applications dimension

N	Items	Mean	Standard deviation	Order	Role
4	Knowledge management contributes to reducing costs, so it generates new revenue in the company.	3.61	.1563	1	high
2	Knowledge management stimulates the company's ability to develop creative capabilities for human resources.	3.59	.1842	2	high
5	Knowledge management contributes to creating and enhancing the company's competitive advantage through the quality of its products.	3.56	.1732	3	high
1	Knowledge management enhances the improvement of company performance, including product auditing.	3.53	0.677	4	high
3	The knowledge management process contributes to coordinating the company's activities and maintaining institutional performance through total quality.	3.52	.0721	5	high
<b>Weighted Mean</b>		<b>3.56</b>	0.163	-	<b>high</b>

From a review of Table 4, it is clear that the mean of the responses of the sample for the items of the dimension of the applications of productive knowledge management has reached 3.56, and it is located at the high level. The result can be attributed, according to the

researcher's opinion, and depending on the responses of the study sample, to the fact that the Arab Center for Pharmaceutical and Chemical Industries In Jordan adopts business intelligence applications to achieve total quality in an effort to achieve competitive advantage in the market. This occurs through the company's need to define the tasks that need to be implemented in managing productive knowledge, in addition to focussing on the distinct product in the competitive market, in order to encourage harmony of the teamwork to reach overall quality.

### ***The Second Dimension: Decision Support Applications***

The means and standard deviations of the sample's responses were calculated for each of the decision support applications dimension items, and in descending order. The following table illustrates this.

**Table 5:** Means and standard deviations of the of the decision support applications dimension

N	Items	Mean	Standard deviation	Order	Role
5	Decision support provides the ability to provide quality control programs for all products to prepare product quality analysis.	.363	.1673	1	high
3	The company has data warehouses that support the decision-making process.	.358	.1735	2	high
4	The company's decision support process makes it easier to respond quickly to competitive situations with other companies.	3.56	.1563	3	high
2	The data is converted into information and then into knowledge for the purpose of making correct decisions in the company.	.355	0.608	4	high
1	The company provides computerised systems that help in making appropriate decisions about total quality.	.351	.0546	5	high
<b>Weighted Mean</b>		<b>3.52</b>	0.734	-	<b>high</b>

From a review of Table 5, it is clear that the mean of the sample's responses on the items of the dimension of decision support applications has reached 3.57, which is a high mean. The researcher suggests that this result is due to the fact that the Arab Center for Pharmaceutical and Chemical Industries in Jordan depends on the principles of decision support applications in its work by engaging all levels of management, exchanging opinions, and taking their suggestions in the process of improving and developing the quality of its products towards

the best, in order to obtain international quality certificates, such as ISO, and commitment to its requirements. In addition, this result can be explained by the company providing quality control programs, and computerised systems that help in the ability to take appropriate decisions regarding total quality.

### ***Third Dimension: Technological Applications***

The means and standard deviations of the sample's responses were calculated for each of the technological applications dimension items, and in descending order. The following table illustrates this.

**Table 6:** Means and standard deviations of the of the technological applications dimension

<b>N</b>	<b>Items</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Order</b>	<b>Role</b>
3	The company provides the use of auditing software and methods for achieving total quality.	.363	.1604	1	high
	The company's modern technological applications contribute to improving the quality of auditing and product control.	.361	.1823	2	high
5	The company's auditors have the appropriate technical qualification to deal with modern hardware and software.	.359	.1621	3	high
4	The company is constantly updating its devices and networks to ensure improved performance and quality.	.356	.0722	4	high
2	The company is keen on acquiring the latest technology application software for product quality, and checking product quality.	.352	.0703	5	high
<b>Weighted Mean</b>		<b>3.58</b>	0.688	-	<b>high</b>

From Table 6, it is clear that the mean of the responses of the sample individuals for the dimension of technological applications has reached 3.58, and the researcher suggests this result is due to the fact that the Arab Center for Pharmaceutical and Chemical Industries in Jordan provides the use of auditing software and methods to achieve quality; to improve the quality of auditing, and control of products; the employees of the company are technically qualified to deal with modern hardware and software; and the company is constantly updating its devices and networks to ensure improved performance and quality. This result is related to the company ensuring that the latest technology application software is acquired for product quality, and product quality audits.

**The Second Question:** are there statistically significant differences at the level of significance (0.05) between the responses of workers at the Arab Center for Pharmaceutical and Chemical Industries in Jordan about the impact of business intelligence applications on achieving overall quality, which are attributable to the study variable of job title?

To answer this question, the one-way ANOVA test was used, as shown in the following table:

**Table 7:** Analysis of one-way ANOVA test according to the variable of job title

Job Title	N	Mean	Standard deviation	F-Value	Significance	Decision
Director General	1	145.92	13.523	2.262	0.070	insignificant
Director of the Department	11	173.95	14.174			
Head of the Department	17	156.75	12.339			
Employees	65	184.84	15.832			

The results in Table 7 indicate that the calculated value of F was 2.262, and it is not statistically significant at the level of significance 0.05, where the value of the level of significance was  $0.070 > 0.05$ . This confirms that there are no significant differences between the responses of the study sample individuals, according to the variable of the job title. This can be attributed to the organisational vision from which all employees in the Arab Center for Pharmaceutical and Chemical Industries in Jordan — a manager, head of department or employees of the company — emphasize the importance of employing business intelligence applications to achieve total quality in the company, in order to take a competitive advantage in the market through a good product.

**The Third Question:** is there a statistically significant effect at the significance level (0.05) for business intelligence applications in achieving overall quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan?

To answer this question, some of the basic conditions for performing regression analysis were verified and represented by normal distribution by identifying the values of skewness coefficients, in addition to the absence of any problems with multiple linear correlations through the tests for VIF, and the tolerance test. The following table shows the results of these tests.

**Table 8:** Skewness coefficients and VIF and Tolerance Tests

Independent variable	Skewness coefficient	VIF	Tolerance
Productive knowledge management applications	-0.75	2.50	0.40
Decision support applications	-0.60	2.54	0.39
Technological applications	-0.47	1.03	0.96

The results of Table 8 indicate that the values of skewness coefficients ranged between -0.47 for technological applications, and -0.75 for knowledge management applications. These values are considered close to the accepted values for the normal distribution, as they ranged between -3 to +3. The table indicates that the VIF values were less than four, where the largest value of the decision support applications variable was 2.54, which is less than four, and is the value that is considered an upper limit in most studies. Thus, it cannot be exceeded, indicating that there is no correlation linear problem between the three independent variables. The tolerance value was shown to be greater than 0.02, as these values usually express the absence of a problem of multiple linear correlation between the independent variables, if the tolerance value is greater than 0.02.

To verify the hypothesis related to the third question, which states: “there is no statistically significant effect at the significance level (0.05) for business intelligence applications in achieving overall quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan”, the hypothesis was tested using a multiple regression analysis, and the following table shows the results of testing this hypothesis.

**Table 9:** Results of multiple linear regression analysis to examine the effect of business intelligence applications on achieving overall quality

Independent variable	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F	Sig F
Productive knowledge management applications	0.809	65.04	64.08	106.05	0.000
Decision support applications					
Technological applications					

The results in Table 9 indicate a statistically significant effect of business intelligence applications in achieving overall quality in the Arab Center for Pharmaceutical and Chemical Industries in Jordan, where the value of the relationship between the components of the model obtained through multiple regression analysis was 0.809. This value is considered statistically significant because the calculated value of F of 106.05 was statistically significant, which is greater than the tabular value of 2.67, with degrees of freedom of three, and 165, and with a significance level of 0.000, which is less than 0.05. This result indicates

that there is a clear impact of business intelligence applications on achieving total quality in the Arab Center for Pharmaceutical and Chemical Industries.

The Table 9 shows that the R2 values indicate the ratio of variance of the dependent variable that can be explained by the independent variable, and this ratio has reached 65.04 per cent. This ratio shows the extent of the ability of the three components of the model obtained to predict the dependent variable. With this result, the zero hypothesis is rejected, and the alternative hypothesis is accepted. That is, business intelligence, with its combined components, affects the achievement of total quality. The following table also shows the results of the regression model coefficients that were reached.

**Table 10:** Regression coefficients values and test results demonstrate the significance of these coefficients from multiple regression analysis of the impact of business intelligence applications on achieving total quality in the Arab Center for Pharmaceutical and Chemical Industries

Independent variable	$\beta_0$	Std...err	$\beta$	t	Sig t
Productive knowledge management applications	0.698	0.061	0.452	7.37	0.000
Decision support applications		0.056	0.227	4.02	0.000
Technological applications		0.039	0.110	2.84	0.005

Through the results of Table 10, a model can be reached to predict the values of achieving total quality through business intelligence applications, as follows:

Achieving total quality = 0.227 x decision support applications + 0.452 x productive knowledge management applications + 0.110 technology applications + 0.698.

### Recommendations

1. Emphasising the importance of employing business intelligence applications in companies to achieve a highly competitive advantage.
2. Focus on practices related to the applications of productive knowledge management, decision support, and technology.
3. Focus on coordination and follow-up practices through employing business intelligence applications within all aspects of the company.
4. The necessity to work on developing standards for total quality management, and organisational culture in improving the company's performance, so that indicators of the ability to build plans are organised, coordinated, and subsequently, followed up and evaluated.



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