

The impact of technological change on organizational productivity and customer satisfaction:

A case study of a number of factories operating in Jordan

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## **ABSTRACT**

This study aims to determine the impact of technological change on organizational productivity and customer satisfaction. The study sample consisted of 220 employees who worked in some factories operating in Jordan. A questionnaire was designed for this purpose, and the Cronbach was (0.803). The study results found that there is an impact of technological change on organizational productivity and customer satisfaction. The employees feel strongly that both the organizational productivity and the customer satisfaction affected by the impact of technological change. It was found that there is a statistical significant impact due to the age, job and place of the employees of technological change on organizational productivity.

Furthermore, results indicate that there is statistical significance due to the experience of the employees, the employees of experience from 5 years to less than 10 years feel more than the employees with experience less than 5 years that there is an impact of technological change on customer satisfaction.

**Keywords:** Technological, Productivity, Satisfaction, Jordanian factories.

## 1. INTRODUCTION

Industrial growth led to a change in different versions, and the development of new systems led to the ability to create knowledge and technology which become one of the basic components of the economy .

In light of the rapid changes in the work environment many reasons drive the organizations for change, including the development of the methods used in work, changes in policies, laws and regulations, the development of workers' awareness, the increase in their aspirations and needs, the change in the public's view and expectations from public or private institutions.

The increase in the capacity of the market were established and reduce cost in a number of ways like , cost of operation by decreasing the working time needed to make products and achieving flexibility, increasing the market share of the competitive environment and improving the quality of the product or service

The impact of modern technology on the performance of organizations directly contributed to increase productivity, the use of processing programs for production processes, in addition to the automation of office work, as well as the creation of technological and practical solutions for inventory management and production control, all of which contributed to a large extent in reducing the total cost of production, besides reducing the time required to carry out administrative tasks [ 1].

## 2. LITERATURE REVIEW

The study showed that there is a statistically significant relationship between the degree of technology used and the performance efficiency of the employees of the organization, because the organization lacks to educate employees about the importance of introducing technology to perform.

The study recommended that greater attention should be paid by the senior management to educate workers about the importance of developing technology before introducing the new technology to work, in order to ensure their acceptance and interaction with it[ 2].

The study aimed to reveal the impact of the use of educational technology on the academic achievement of students with learning difficulties and their motivation towards learning it in State of Qatar.

The study recommended adopting the use of educational technology in teaching and designing curricula [3].

The study aimed to identify the impact of the use of information technology on the job performance of employees at the Higher Institute of Science and Technology in Jameel. The employees have come up with a set of proposals that contribute to raising and improving the performance and thus improving their overall performance [ 4].

The study aimed at recognizing the impact of information and communication technology on job performance in small and medium-sized enterprises. The study found that there is a correlation between the use of information and communication technology and job performance. Also a statistically significant differences in the degree to which the personal characteristics of the sample members influence their answers about the level of job performance was found[ 5].The study, aimed at showing the extent to which technology and communication with all its components contribute to improving marketing performance, profitability, market share, adaptation, product quality and customer satisfaction for institutions. For this purpose, the relationship between ICT infrastructure and marketing performance elements was tested.

It was found that the communication technology variable explains 42% of the variables that occur in the marketing performance, and the rest is due to other factors and explains the positive contribution of information and communication technology in maximizing the profitability and increasing the profitability of these institutions and in raising the market share and increasing the efficiency of product promotion and providing opportunities to enhance the current markets [ 6].

The study address that the companies must be consistent in the quality of the products they produce.

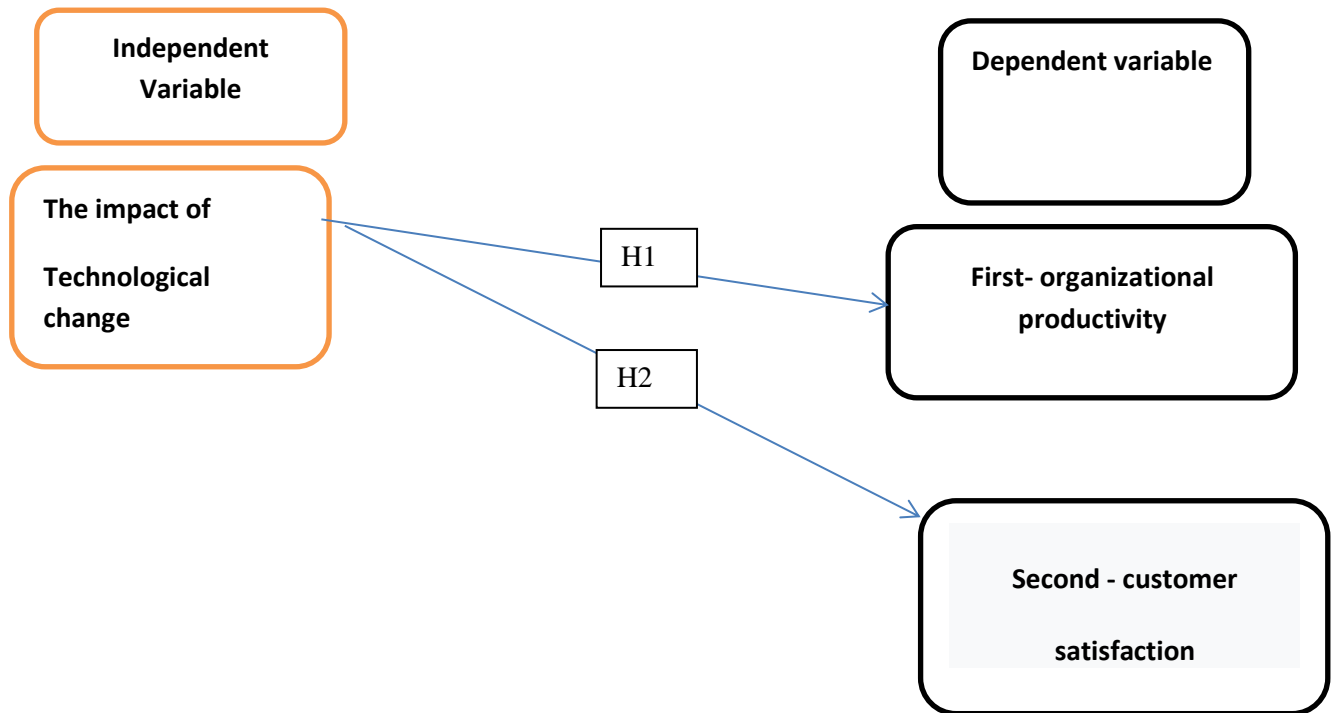
Mechanization or automation of parts of production processes can help. To provide flexibility, companies often need to strike a balance between technology and human efficiency, where technological systems are beneficial to production [ 7].The study presented the impact of technological development on receiving and producing economic information on television, by demonstrating the technological methods used in the production of the television image carrying economic information and showing its impact on the reception process by defining the basic comprehensive frameworks for the elements of this image.

The study seeks to achieve the following objectives: to shed light on the role of technological development in the production of economic information and its impact on the reality of the local and global economy, and to highlight the changes in the process of receiving this economic information in its various dimensions [ 8].

The study aimed to determine the relationship and impact of production technology with its dimensions (product technology, process technology) in product design at the level of the General Company for Tire Industry in Babylon. Correlation analysis and regression analysis were used to verify the study hypotheses. The study reached a set of recommendations, the most prominent of which was the need to keep pace with contemporary developments in production and operations management, especially with regard to the use of modern technologies in production technology and product design [ 9].

The study identified the organizational change strategies used by organizations in light of the conditions and rapid developments, which is the strategy of technological change and revealing the most important mysteries of its strategy and its role in facilitating the process of adopting total quality management [ 10].

**3. THE FRAMEWORK (Figure 1):** After referring to many studies specially to the studies of each of: Garrash (2020) and Mohamed (2022)



(Figure 1)

Resources: developed by the researches

Dependent variables: The first variable is the organizational productivity , the second variable is the customer satisfaction . The independent variable is the impact of technological change.

#### 4. RESEARCH QUESTION

The study seeks to answer the following question: What is the impact of technological change on organizational productivity and customer satisfaction?

#### 5. OBJECTIVES OF THE STUDY

This study aims to show the impact of technological change on the productivity of organizations and on customer satisfaction

#### 6. LIMITATIONS

Human limits: Applied to workers in (30) industrial factories in Jordan

Spatial limits: Applied to some factories in Amman, Irbid and Zarqa cities

Time limits: Applied in the first semester of the academic year 2022/2023

Objective limits: Deals with the impact of the use of technology on the productivity of organizations and on customer satisfaction in a number of Jordanian factories.

The generalization of the results of this study depends on the seriousness of the study sample's response to the questionnaire's paragraphs.

## **7. STUDY INSTRUMENT**

To achieve the objectives of the study, a two-part questionnaire was designed. The first part is personal information about employees, while the second part is 36 paragraphs, corresponding to a five-Likert score (strongly agree = 5, agree = 4, neutral = 3, disagree = 2, strongly disagree = 1)

The questionnaire was presented to a number of experts who have experience in the field for the purpose of arbitrating the questionnaire and indicating the clarity and comprehensiveness of the paragraphs. The questionnaire was modified in the light of the experts' recommendations.

The questionnaire was applied to a number of employees in Jordanian factories who were not members of the sample. The reliability coefficient of the questionnaire was Cronbach's Alpha (0.803) which is acceptable for the purpose of the study.

## **8. THE STUDY PROBLEM**

The poor productivity in a number of factories operating in Jordan and the inability to meet the needs of the local market and dissatisfaction of some customers, these problems led to technological changes in factories operations to reach the best productivity which fulfill the customers' needs.

## **9. THE IMPORTANCE OF THE STUDY**

The importance of the study lies in its theoretical and practical importance, as the theoretical aspects ,the study can add new knowledge and provide the Arab library with a new theoretical framework on the impact of technology on the productivity of organizations and on customer satisfaction.

From a practical point of view, there is a distinct addition to Jordanian organizations to reach the impact of using technology on productivity and customer satisfaction.

## **10. TERMINOLOGY OF THE STUDY**

### **Technology:**

The sum techniques, skills, technical methods and processes used in the production of goods or services to achieve the goals[ 11].

### **Productivity:**

A measure of production efficiency with respect to a specific factor, such as the number of workers, capital, investment volume, or production machine for a specific period of time. [ 12].

### **customer satisfaction:**

A measure of the extent to which a company's products and services meet or exceed customer expectations. It is seen as a key performance indicator within the business sector.[ 13].

## **11. STATISTICAL ANALYSIS**

The collected data from the questionnaire were analyzed using the statistical program (SPSS26) and descriptive statistics were used to calculate the means and standard deviations. ANOVA test and the Scheff posttest were also used.

## **12. POPULATION AND SAMPLE SIZE**

The population consists of all employees in 30 factories in Jordan. Randomly a sample of (220) employees was chosen and distributed as follows: 60.0% male, 49.1% married, 44.1% experience from 5 years to less than10, 52.7% age from 25 years to less than 35, 46.8% Line employee and 45.5% worked in Amman City.

## **13. HYPOTHESES**

First hypothesis: There are statistically significant differences

at ( $\alpha \leq 0.05$ ) between employees of Jordanian factories of the impact of technological change on organizational productivity due to personal variables (gender, status, experience, age, job and place).

Second hypothesis: There are statistically significant differences

at ( $\alpha \leq 0.05$ ) between employees of Jordanian factories of the impact of technological change on customer satisfaction due to personal variables (gender, status, experience, age, job and place).

Third hypothesis: There are statistically significant differences

at ( $\alpha \leq 0.05$ ) between of the impact of technological change on organizational productivity faced by employees of Jordanian factories.

Fourth hypothesis: There are statistically significant differences

at ( $\alpha \leq 0.05$ ) between of the impact of technological change on customer satisfaction faced by employees of Jordanian factories.

## 14.RESULTS

To answer the question of the study:

What is the impact of technological change on organizational productivity and customer satisfaction? Mean and standard deviations was found. Table (1)

Table (1)  
Descriptive Statistics

variables	N	Minimum	Maximum	Mean	Std. Deviation
production	220	3.00	5.00	4.3289	.31563
satisfaction	220	3.44	5.00	4.2924	.30380
technology	220	3.75	4.94	4.4145	.23985
Valid N (listwise)	220				

Table (1) shows that the mean of the organizational productivity that affected by the impact of technological change reached (4.3289) with a standard deviation of (0.31563).The mean of the customer satisfaction that affected by the impact of technological change reached (4.2924) with a standard deviation of (0 .30380).This mean that the employees feel strongly that both the organizational productivity and the customer satisfaction affected by the impact of technological change.

## 15.TESTING HYPOTHESES

First hypothesis: There are statistically significant differences at ( $\alpha \leq 0.05$  between employees of Jordanian factories of the impact of technological change on organizational productivity due to personal variables (gender, status, experience, age, job and place).

To test the first hypothesis, we conducted ANOVA test and the results show that there is statistical significance due only to the age job and place of the employees. Table (2)

Table (2)  
ANOVA Test for organizational productivity

		Sum of Squares	df	Mean Square	F	Sig.
Age	Between Groups	1.482	3	.494	5.246	.002
	Within Groups	20.336	216	.094		
	Total	21.818	219			
job	Between Groups	.927	2	.463	4.813	.009
	Within Groups	20.891	217	.096		
	Total	21.818	219			
place	Between Groups	.939	2	.470	4.880	.008
	Within Groups	20.879	217	.096		
	Total	21.818	219			

To find out the differences between the age, job and place of the employees, “Scheff Test” was used as a posttest. Table (3), Table (4) and Table (5) show the results.

Table (3) Scheffe of meanproduction and age

(I) age	(J) age	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-.26138*	.07277	.006	-.4664	-.0564
	3.00	-.24797*	.07979	.024	-.4728	-.0231
	4.00	-.32113*	.08565	.003	-.5625	-.0798
2.00	1.00	.26138*	.07277	.006	.0564	.4664
	3.00	.01342	.05191	.995	-.1328	.1597
	4.00	-.05975	.06054	.807	-.2303	.1108
3.00	1.00	.24797*	.07979	.024	.0231	.4728
	2.00	-.01342	.05191	.995	-.1597	.1328
	4.00	-.07317	.06882	.770	-.2671	.1207
4.00	1.00	.32113*	.08565	.003	.0798	.5625
	2.00	.05975	.06054	.807	-.1108	.2303
	3.00	.07317	.06882	.770	-.1207	.2671

\*. The mean difference is significant at the 0.05 level.

The results of table(3) indicate that the employees with age less than 25 years feel more than the employees with age from 25 years to 50 years and more, that there is impact of technological change on organizational productivity.

Table (4) Scheffe of meanproduction and job

(I) job	(J) job	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-.02454	.05922	.918	-.1705	.1214
	3.00	.11360	.05588	.129	-.0241	.2513
2.00	1.00	.02454	.05922	.918	-.1214	.1705
	3.00	.13813*	.04747	.016	.0211	.2551
3.00	1.00	-.11360	.05588	.129	-.2513	.0241
	2.00	-.13813*	.04747	.016	-.2551	-.0211

\*. The mean difference is significant at the 0.05 level.

The results of table (4) indicate that the line employees feel more than the head of department, that there is impact of technological change on organizational productivity.

Table (5) Scheffe of mean production and place

(I) place	(J) place	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-.10623	.04834	.092	-.2254	.0129
	3.00	-.15455*	.05373	.017	-.2870	-.0221
2.00	1.00	.10623	.04834	.092	-.0129	.2254
	3.00	-.04831	.05744	.702	-.1899	.0933
3.00	1.00	.15455*	.05373	.017	.0221	.2870
	2.00	.04831	.05744	.702	-.0933	.1899

The results of table (5) indicate that the employees working in factories in Amman City feel more than the employees working in factories in Irbid City, that there is impact of technological change on organizational productivity.

So we accept the hypothesis

Second hypothesis: There are statistically significant differences at ( $\alpha \leq 0.05$ ) between employees of Jordanian factories of the impact of technological change on customer satisfaction due to personal variables (gender, status, experience, age, job and place).

To test the second hypothesis, we conducted ANOVA test and the results show that there is statistical significance due only to the experience of the employees. Table (6)

Table (6)

ANOVA Test for customer satisfaction

experience	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.592	2	.296	3.275	.040
Within Groups	19.620	217	.090		
Total	20.212	219			

To find out the differences between the experiences of the employees, "Scheff Test" was used as a posttest. Table (7).

Table (7) Scheffe of customer satisfaction and experience

(I) experien ce	(J) experien ce	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-.00192	.04573	.999	-.1146	.1108
	3.00	.12754	.05629	.079	-.0112	.2663
2.00	1.00	.00192	.04573	.999	-.1108	.1146
	3.00	.12946	.05423	.060	-.0042	.2631
3.00	1.00	-.12754	.05629	.079	-.2663	.0112
	2.00	-.12946	.05423	.060	-.2631	.0042

The results of table (7) indicate that the employees of experience from 5 years to less than 10 years feel more than the employees with experience less than 5 years that there is impact of technological change on customer satisfaction.

So we accept the hypothesis

Third hypothesis: There are statistically significant differences

at ( $\alpha \leq 0.05$ ) between of the impact of technological change on organizational productivity faced by employees of Jordanian factories.

To test this hypothesis we conduct the Simple Regression. Table (8)

Table (8)

Results of Simple Regression for the third hypothesis

Dependent Variable	R	R Square	Independent Variable	F	SIG
organizational productivity	.230a	.053	technological change	12.174	.001a

Since F is significant (sig=.001)therefore all dimensions of the independent variable are to be taken into consideration. R Square=.053.This means that the independent variable ( technological change ) explain only 5.3% of the variance(variation) of the dependent( organizational productivity). It is clear from the table that the value of F was (12.174), and therefore we accept the hypothesis

Fourth hypothesis: There are statistically significant differences

at ( $\alpha \leq 0.05$ ) between of the impact of technological change on customer satisfaction faced by employees of Jordanian factories.

To test this hypothesis we conduct the Simple Regression. Table (9)

Table (9)

Results of Simple Regression for the fourth hypothesis



Dependent Variable	R	R Square	Independent Variable	F	SIG
customer satisfaction	0.064a	0.004	technological change	0.898	0.344a

Since F is not significant (sig=0.344a) therefore all dimensions of the independent variable cannot be taken into consideration. R Square= 0.004. This means that the independent variable ( technological change ) explain only 0.4% of the variance (variation) of the dependent ( customer satisfaction). It is clear from the table that the value of F was (0.898), and therefore we reject the hypothesis

## 16. CONCLUSION

The results conclude that there is impact of technological change on organizational productivity and customer satisfaction. The employees feel strongly that both the organizational productivity and the customer satisfaction affected by the impact of technological change. It was found that there is a statistical significant impact due only to the age, job and place of the employees of technological change on organizational productivity. The employees with age less than 25 years feel more than the employees with age from 25 years to 50 years and more, that there is impact of technological change on organizational productivity and the line employees feel more than the head of department, that there is impact of technological change on organizational productivity. Also the employees from Amman City feel more than the employees from Irbid City, that there is impact of technological change on organizational productivity.

The results also show that there is statistical significance due only to the experience of the employees, the employees of experience from 5 years to less than 10 years feel more than the employees with experience less than 5 years that there is impact of technological change on customer satisfaction.

## 17. RECOMMENDATION

Based on the findings of this study, one can assert that technology is beneficial, and it is essential to economic growth and development. The study recommends the following:

Encouraging older employees to develop their skills and abilities in increasing the impact of technological change.

Enabling employees with little experience to act freely and implement good relationships to gain customer satisfaction and increase productivity

Provide good environment for employees of both sexes to enhance the impact of technological change on organizational productivity and customer satisfaction

Support employees in factories in various cities of Jordan

## 18. REFERENCES

1. <https://www.meemapps.com/term/productivity#>
2. Abu Issa, Mabrouk Milad Al Shaibani. (2006). The impact of technology on workers' performance: An applied study on the National Center of Meteorology for the time period (1994-2004). (Master's thesis). Omdurman Islamic University, Sudan.
3. Ait Ambarek, Samia (2020), The Impact of Information and Communication Technology. Doctor of Science in Commercial Sciences Branch: Business Operations Management
4. Ali Abdulhassan Abbas, Hussien Al Hasnawi, Alaa Farhan Talib, (2011), The impact of production technology in the design of the product A field study at the General Company for the manufacture of tires in Babylon, Iraqi journal for Administrative Sciences , volume 29. Contributions Journal for Research and Studies
5. Garrash, Saleh Saad, (2020) The impact of the use of information technology on the job performance of employees in educational institutions (a field study of the Jameel Higher Institute of Science and Technology / Libya) The University Journal Issue No23-2021 Vol.4.
6. Ghadeer Abdel Halim Nimr Al-Mustafa, Muhammad Adnan Muhammad Ijbara (2020), the impact of the use of educational technology on the academic achievement of students with learning difficulties in mathematics for the fourth grade of primary school and their motivation towards learning it in the city of Doha in the State of Qatar International Journal of Quality Assurance.
7. <https://en.wikipedia.org/wiki/>

8. <https://hbrarabic.com>
9. <https://mawdoo3.com/>
10. Mohamed Abdel Aziz, (2022), the role of technology in production and operations management
11. Monkar,Murad,Maryam,Sharki,(2015),"Technological change strategy under total quality management"Revue Des Sciences Humaines, Volume 26, Numéro 3, Pages 565-583.
12. Omar Ibrahim Bousaada, (2016), The impact of technological development on the production and receipt of television economic information.
13. Radhia Badaa (2017), the impact of information and communication technology on job performance in small and medium enterprises, the case of Fogh Al Janoub Foundation, Master's thesis, Kasdi Merbah University.Volume 1, Numéro 1, Pages 1-26 -2016-12-31.