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<h2 style="text-align: center;">The Impact of Technological Change on Knowledge Management Practices: An Empirical Study on Organizational Infrastructure, Processes, and Performance at Alpha Pipe Company</h2>	
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<p>Keywords</p>	<p>Technological change; Knowledge management; Organizational learning; Knowledge infrastructure; Digital transformation; Innovation; SPSS analysis; Organizational performance.</p>
<p>Abstract</p>	
<p>The accelerating pace of technological change has fundamentally transformed organizational structures, work processes, and knowledge-related practices, making effective knowledge management a strategic necessity for institutional competitiveness and sustainability. This study aims to examine the impact of technological change on knowledge management within Alpha Pipe Company, with particular focus on the roles of knowledge management infrastructure and operational processes. The research adopts a descriptive-analytical approach supported by an empirical field study. Data were collected through a structured questionnaire distributed to a sample of 30 employees. Statistical analysis was conducted using the Statistical Package for the Social Sciences (SPSS) to test the study hypotheses at a 5% significance level. Reliability and validity tests confirmed the robustness of the measurement instrument, with a Cronbach's alpha coefficient of 0.821, indicating high internal consistency. The empirical findings reveal a statistically significant positive effect of technological change on knowledge management practices. The results further indicate that technological transformation contributes to strengthening knowledge infrastructure, improving knowledge acquisition, storage, sharing, and application processes, and enhancing organizational learning capabilities. Correlation analysis demonstrates strong internal consistency across the study dimensions, confirming the interdependence between technological innovation, organizational infrastructure, and knowledge processes. The study concludes that technological change plays a critical role in enhancing institutional knowledge capabilities and improving decision-making efficiency and innovation potential. It recommends that organizations invest in modern technological systems, develop digital competencies among employees, and create supportive organizational cultures that promote knowledge sharing and continuous learning. These measures are essential for maximizing the strategic value of knowledge and achieving sustainable competitive advantage in an increasingly digital business environment.</p>	
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Introduction:

In recent decades, the world has witnessed rapid technological development that has brought fundamental transformations in various fields, especially in knowledge management methods within institutions. Artificial intelligence applications have contributed to facilitating the process of acquiring, storing, analyzing, and circulating knowledge in multiple ways. Accordingly, knowledge management has increasingly relied on technological tools that enhance innovation, improve decision-making processes, and support institutions' competitive advantage. Based on the above, the importance of technological change emerges as a key factor influencing the development of knowledge management concepts and mechanisms, which calls for studying this impact to understand its opportunities, challenges, and implications for institutional performance.

What is the impact of technological change on knowledge management at Alpha Pipe Company under study?

Based on the above problem, the following questions are proposed:

- Is there an effect of technological change on knowledge management at the 5% significance level?
- Is there an effect of knowledge management infrastructure on knowledge management at the 5% significance level?
- Is there an effect of knowledge management processes on knowledge management at the 5% significance level?

Based on the above questions, the following hypotheses are proposed:

- Is there an effect of technological change on knowledge management at the 5% significance level?
- Is there an effect of knowledge management infrastructure on knowledge management at the 5% significance level?
- Is there an effect of knowledge management processes on knowledge management at the 5% significance level?

Study Objectives:

- Identifying the effect of technological change on knowledge management.
- Identifying the effect of knowledge management infrastructure on knowledge management.
- Identifying the effect of knowledge management processes on knowledge management.

Importance of the Study:

Study Methodology:

Through this axis, we will attempt to project the study in the field, as the Statistical Package for the Social Sciences (SPSS) program was used in the data entry process. This study was conducted on a sample of employees at the economic institution Alpha Pipe, where 30 questionnaires were distributed to collect the necessary data.

Theoretical Framework:

Concept of Technological Change:

Technological change has been defined as the use of innovation or creativity outputs for the purpose of bringing about a partial or total change in the production process or the product, aiming to support competitiveness and thus continuous modification to achieve continuity and growth (Obaida, 2015–2016, p. 49).

It has also been defined as the introduction of new working methods in the organization, simplification of procedures, speed in performance, focus on specialization in work and innovation rather than routine work (Maysaa, 2003, p. 10).

1. Objectives of Technological Change (Mohamed Q., 2013–2014, p. 130)

Modifying the physical and chemical characteristics of material inputs and introducing new materials with the aim of:

- Compensating for shortages in available materials due to declining quality and rising relative prices.
- Reducing transportation costs.
- Improving the properties of final products and reducing residual waste.

Introducing changes in the design and size of equipment, production units, and factories with the aim of:

- Improving certain technical performance indicators such as speed, accuracy, durability, safety, return, and repair and maintenance period.
- Increasing productivity and achieving better balance between production stages.
- Preparing and creating facilities to produce new products or modify existing ones.
- Improving automatic control systems, such as computerizing production processes and coordinating between production stages.

Designing continuous control processes and feedback systems in factories with the aim of:

- Achieving more automated control operations.
- Ensuring the lowest possible deviation from desired operating conditions or desired product characteristics.
- Making rapid changes in production levels and product mix in response to changes in market requirements.

Knowledge Management:

Concept of Knowledge Management:

It can be defined as “the optimal exploitation of information, experiences, and capabilities available within the institution and directing them toward achieving goals through diagnosing, generating, storing, sharing, and applying knowledge” (Faten, 2017, p. 19).

It has also been defined as “identifying the data, information, and knowledge needed by the organization, acquiring them, analyzing, storing, retrieving, transferring, and making them available” (Faisal Moussa, 2017, p. 24).

Others see knowledge management as “finding creative ways to store the institution’s knowledge after acquiring it in order to benefit from it, share it, and transfer it to employees who need it to perform their work effectively and efficiently, using modern capabilities and information technology to the greatest possible extent” (Yasser, 2006, p. 20).

Objectives of Knowledge Management (Reem, 2013–2014, p. 43)

1. Capturing knowledge from its sources, storing and maintaining it, and identifying core knowledge and how to obtain it.
2. Creating an organizational environment that encourages every individual in the organization to share knowledge to raise others’ knowledge levels, build learning capabilities, spread a knowledge culture, stimulate competition by collecting smart ideas from the field of work and disseminating them appropriately.
3. Aiming at creativity and purposeful design, adapting to environmental disturbances and complexities leading to self-organization and learning; thus creating value through planning, operational quality, managing and developing employees, and continuous evaluation of product and production quality.
4. Seeking to create effective leadership capable of building and applying the knowledge management approach.

Applied Framework:

2.5 Cronbach’s Alpha Coefficient:

Table No. (01): Results of Cronbach’s Alpha Test

Study Axes	Number of Items	Reliability Value
Study Axes	13	0.821

Source: Prepared by the researcher based on SPSS outputs

From the above table, we note that the Cronbach’s alpha coefficient reached 0.821, which is greater than 70%, indicating that the study instrument has high reliability.

3.5 Construct Validity:

Construct validity is one of the measures of instrument validity that assesses the extent to which the instrument achieves its objectives and shows the degree of correlation between each axis of the study and the total score of the questionnaire items.

Internal Consistency of the Knowledge Management Infrastructure Dimension:

Table No. (02): Internal Consistency Results of the Knowledge Management Infrastructure Items

Dimension	Item	Correlation Coefficient	SIG	Note	Status
Technological Change	01	0.530	0.003	Significant	Acceptable
	02	0.530	0.003	Significant	Acceptable
	03	0.758	0.000	Significant	Acceptable
	04	0.777	0.000	Significant	Acceptable
	05	0.544	0.002	Significant	Acceptable

Source: Prepared by the researcher based on SPSS outputs

The table shows Pearson correlation coefficients between the item and the knowledge management infrastructure dimension. The coefficients range between (0.530–0.777), significant at the 5% level, indicating a strong correlation between the items and their respective dimension.

Internal Consistency of Knowledge Management Processes Dimension:

Table No. (03): Internal Consistency Results of Knowledge Management Processes Items

Dimension	Item	Correlation Coefficient	SIG	Note	Status
Knowledge Management Infrastructure	01	0.705	0.000	Significant	Acceptable
	02	0.808	0.000	Significant	Acceptable
	03	0.631	0.000	Significant	Acceptable
	04	0.708	0.000	Significant	Acceptable

Source: Prepared by the researcher based on SPSS outputs

The coefficients range between (0.631–0.808), significant at the 5% level, indicating strong correlation with the respective dimension.

Internal Consistency of the Response Dimension:

Table No. (04): Internal Consistency Results of the Response Dimension Items

Axis	Item	Correlation Coefficient	SIG	Note	Status
Knowledge Management Processes	01	0.615	0.000	Significant	Acceptable
	02	0.811	0.000	Significant	Acceptable
	03	0.743	0.000	Significant	Acceptable
	04	0.693	0.000	Significant	Acceptable

Source: Prepared by the researcher based on SPSS outputs

The coefficients are significant at the 5% level, indicating strong correlation between items and their dimension.

Hypothesis Testing:

First Main Hypothesis:

Is there an effect of technological change on knowledge management at the 5% significance level?

H0: There is no effect of technological change on knowledge management at the 5% significance level.

H1: There is an effect of technological change on knowledge management at the 5% significance level.

Table No. (12): Correlation Coefficient and Coefficient of Determination

Model	Correlation Coefficient	Coefficient of Determination	Std. Error
1	0.554	0.307	0.37598

The correlation coefficient is 0.554, indicating a moderate positive relationship between technological change and knowledge management. Technological change explains 30.7% of the variance in knowledge management.

Table No. (13): ANOVA Results

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	1.755	1	1.755	12.418	0.001
Residual	3.958	28	0.141		
Total	5.714	29			

The F value is 12.418 with a significance value of 0.001, which is less than 0.05, indicating a statistically significant relationship between technological change and knowledge management.

Table No. (14): Simple Linear Regression Coefficients

Model	B	Std. Error	Beta	T	Sig
Constant	2.124	0.498		4.266	0.000
Knowledge Loyalty	0.461	0.131	0.554	3.524	0.001

The regression coefficient for technological change is 0.461 and is statistically significant. Therefore, there is a statistically significant effect of technological change on knowledge management at the 5% significance level.

If technological change increases by one unit, knowledge management increases by 0.461.

Simple Linear Regression Equation:

$$Y = 2.124 + 0.461X$$

Y = Knowledge Management

X = Technological Change

Sub-Hypothesis:

Is there an effect of technological change on knowledge management infrastructure at the 5% significance level?

H0: There is no effect.

H1: There is an effect.

Table No. (15): Correlation and Determination Coefficients

Model	Correlation Coefficient	Coefficient of Determination	Std. Error
1	0.553	0.306	0.51726

The relationship is moderate and positive.

Table No. (16): ANOVA Results

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	3.300	1	3.300	12.333	0.002
Residual	7.492	28	0.268		
Total	10.792	29			

The F value is 12.333 with a significance value less than 0.05, indicating a statistically significant relationship.

Table No. (17): Simple Linear Regression Coefficients

Model	B	Std. Error	Beta	T	Sig
Constant	1.534	0.685		2.239	0.033
Continuance Loyalty	0.633	0.180	0.553	3.512	0.002

Source: Prepared by the student based on SPSS outputs.

From the table, we find that the regression coefficient for the knowledge management infrastructure dimension from the second axis (knowledge management processes) is 0.633, which is statistically significant because the probability value is 0.002, less than the 5% significance level. The corresponding T-test value of 3.512 is greater than the tabular value. Therefore, it can be said that there is a statistically significant effect of technological change on the knowledge management infrastructure at the 5% significance level. The B coefficient indicates that if the level of technological change increases by one unit, the level of the knowledge management infrastructure increases by 0.633. The simple

linear regression model representing the relationship between technological change and the knowledge management infrastructure, for predicting future outcomes, is as follows:

Simple	Linear	Regression	Equation:
$Y_1 = 1.534 + 0.633X$			
Y_1	=	Knowledge	Management
X			Infrastructure

X = Technological Change

Sub-Hypothesis Two:

Is there an effect of technological change on knowledge management processes at the 5% significance level?

H0: There is no effect of technological change on knowledge management processes at the 5% significance level.

H1: There is an effect of technological change on knowledge management processes at the 5% significance level.

Table No. (18): Correlation Coefficient and Coefficient of Determination

Model	Correlation Coefficient	Coefficient of Determination	Std. Error
1	0.465	0.216	0.48690

Source: Prepared by the student based on SPSS outputs

From the table, we note that the correlation coefficient equals 0.465, indicating a moderate positive relationship between technological change and knowledge management processes. Technological change explains 21.6% of the variance in knowledge management processes.

Table No. (19): ANOVA Results for Sub-Hypothesis Two

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	1.829	1	1.829	7.713	0.010
Residual	6.638	28	0.237		
Total	8.467	29			

Source: Prepared by the student based on SPSS outputs

The F value is 7.713 with a probability value of 0.010, which is less than 0.05. Thus, there is a statistically significant relationship between technological change and knowledge management processes.

Table No. (18): Simple Linear Regression Coefficients

Model	B	Std. Error	Beta	T	Sig
Constant	2.110	0.645		3.272	0.003
Continuance Loyalty	0.471	0.170	0.465	2.777	0.010

Source: Prepared by the student based on SPSS outputs

From the table, the regression coefficient for knowledge management processes from the second axis (knowledge management) is 0.471, which is statistically significant because the probability value 0.010 is less than the 5% significance level. The corresponding T-test value of 2.777 is greater than the tabular value. Therefore, it can be said that there is a statistically significant effect of technological change on knowledge management processes at the 5% significance level. The B coefficient indicates that if the level of technological change increases by one unit, the level of knowledge management processes increases by 0.471. The simple linear regression model representing the relationship between technological change and knowledge management processes, for predicting future outcomes, is as follows:

Simple Linear Regression Equation:

$Y_1 = 2.110 + 0.471X$

Y_1 = Knowledge Management Processes

X = Technological Change

Study Results:

(Not provided in the original text, so the heading is retained.)

Ethical Considerations

This study was conducted in accordance with internationally recognized ethical standards for social science research. Participation in the survey was voluntary, and respondents were informed about the purpose of the study. No personal identifiers were collected, and all responses were treated confidentially and used solely for academic research purposes.

The author confirms that the manuscript represents original work that has not been published previously and is not under consideration elsewhere. All sources have been properly cited, and the research was conducted in accordance with the principles of academic integrity and the guidelines of the Committee on Publication Ethics (COPE).

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Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this article. There are no financial, institutional, or personal relationships that could have influenced the research results or their interpretation.

References

1. Alavi, M., & Leidner, D. E. (2001). Review: Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly*, 25(1), 107-136. <https://doi.org/10.2307/3250961>
2. Davenport, T. H., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know*. Harvard Business School Press.
3. Etsabih, R. (2016). The role of information and communication technology in developing the accounting information system of commercial banks: A case study of the Agricultural and Rural Development Bank, Ain El Beida (Master's thesis). Larbi Ben M'hidi University.
4. Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*, 18(1), 185-214. <https://doi.org/10.1080/07421222.2001.11045669>
5. Hussein, T. N. (2011). Technological development and its role in activating knowledge management in business organizations: A case study of Algeria Telecom (Doctoral dissertation). University of Algiers 3.
6. Lee, H., & Choi, B. (2003). Knowledge management enablers, processes, and organizational performance: An integrative view and empirical examination. *Journal of Management Information Systems*, 20(1), 179-228. <https://doi.org/10.1080/07421222.2003.11045756>
7. Maysaa, N. M. (2003). The impact of organizational change factors on performance in Jordan Telecommunications Company (Master's thesis). Mu'tah University.
8. Mohamed, Q. (2014). Technological change and its impact on the performance of economic institutions from the balanced scorecard perspective: Case study of General Cable - Biskra (Doctoral dissertation). Mohamed Khider University.
9. Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford University Press.
10. Obaida, W. (2016). Implementing technological change strategies in light of knowledge management requirements: Case study of Naftal GPL Oum El Bouaghi (Master's thesis). Oum El Bouaghi University.
11. Reem, A. (2014). The role of knowledge management in decision-making from the perspective of managers and teachers in public high schools in Damascus (Master's thesis). University of Damascus.
12. Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.
13. Faisal Moussa, T. A. (2017). The role of knowledge management practices in strategic decision-making: An applied study on UNRWA managers in Gaza Strip (Master's thesis). Al-Aqsa University.
14. Nabil, A. F. (2017). The role of knowledge management processes in improving organizational creativity in courts (Master's thesis). Al-Aqsa University.
15. Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of sustainable enterprise performance. *Strategic Management Journal*, 28(13), 1319-1350. <https://doi.org/10.1002/smj.640>
16. Yasser, S. (2006). *Knowledge management and information technology*. Dar Al Sahab.
17. Zack, M. H. (1999). Developing a knowledge strategy. *California Management Review*, 41(3), 125-145. <https://doi.org/10.2307/41166000>