

Intellectual Property in the Context of Digital Transformation: An Econometric Study of Algeria (2015–2022)

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Abstract :

This study seeks to quantify intellectual property within the context of Algeria's digital transformation over the period 2015–2022, employing a multiple linear regression methodology. The analysis uses the World Intellectual Property Organisation's Global Innovation Index as the independent variable, with the Huawei Global Connectivity Index for Algeria as the dependent variable. To achieve an optimal trajectory of progress in digital transformation and innovation, the acquisition and consolidation of intellectual property are deemed essential. Accordingly, the present study aims to elucidate the study variables and address the challenges associated with the prevailing situation. The findings indicate a statistically significant effect between the study variables in Algeria, and the estimated regression model is also statistically significant.

Keywords: Intellectual property; digital transformation; change; innovation.

JEL Classification : O34, O33, C30

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Introduction:

Intellectual property is considered one of the important topics that Algeria, like other countries worldwide, strives to pursue diligently to keep pace with the digital age, given its connection to economic, cultural, and social development. The subject of intellectual property is a national and international priority, driven by the need for progress across all fields, particularly in light of the global surge in scientific and technological advancement. The twentieth century is often described as the digital age, owing to significant developments in communication methods, which have placed the world in a state of continuous connectivity and enabled individuals to communicate with one another from their locations.

Algeria has sought to improve certain fundamental aspects of digital transformation by establishing a strategy that authorities rely on to advance and demonstrate its performance compared with more advanced and experienced countries in this field.

It has become evident that digitalisation facilitates access to finance, reduces costs, and creates opportunities within society. In light of the above, the research problem may be formulated in the following question:

To what extent does intellectual property exist in the context of Algeria's digital transformation over the period 2015–2022?

To answer this problem, the following two hypotheses were formulated:

There is a non significant effect between the intellectual property innovation index and Algeria's internet connectivity index.

A statistically significant effect exists between the intellectual property innovation index and Algeria's internet connectivity index.

Significance of the Study:

The significance of this study lies in its focus on intellectual property in the context of Algeria's digital transformation, which is of considerable importance for keeping pace with the contemporary era.

Study objectives:

The study aims to test intellectual property in the context of Algeria's digital transformation over the period 2015–2022.

Study Methodology:

This research adopts a descriptive–analytical approach to present and analyse developments in the study variables, as well as an experimental econometric approach, in which statistical methods are employed to measure intellectual property in the context of Algeria's digital transformation over the period 2015–2022, using SPSS v26.

Research Structure:

The research paper is divided into two main sections. The first section presents the theoretical framework for the study variables. In contrast, the second section examines the econometric analysis of intellectual property in the context of Algeria's digital transformation over the period 2015–2022.

Previous studies:

Study by Khayra Shaoushi (Shaoushi, 2023, pp. 17-30): This study aimed to shed light on digital transformation in Algeria. The findings indicate that digital transformation in Algeria has moved from discourse to implementation and is no longer an option but has become a necessity. The study also recommended the involvement of civil society by enabling individuals to benefit from digital services and facilitating their adoption across all sectors.

Study by Louaer Fatima (Louaer, 27 July 2023., pp. 07-31): This study aimed to highlight intellectual property in the digital environment. The findings indicated that digital intellectual property is a modern topic with widespread dissemination,

particularly in everyday life, and that engagement with it is rarely free of charge. Access to the internet has become a given. The study also recommended incorporating digital intellectual property as a core subject within the business law specialisation, given its importance in the economic field.

Study by Safi Saleh (Safi, June 2025., pp. 136-153): This study aimed to shed light on intellectual property and the growing effects of the digital divide, using the works of digital media institutions in Algeria as a model. The findings indicated an absence of digital creativity in developing countries, methods to encourage it for the benefit of research institutions, and the adoption of completed inventions and protected patents, leading to brain drain abroad. The study also

recommended paying attention to protecting intellectual property online.

Study by Chouam Bouchama (Taqoua, April 2023., pp. 418-435): This study aimed to highlight digital transformation as a strategic option in the transition towards a digital economy in Algeria. The findings indicated that, despite Algeria's relative novelty in digital transformation, it is making efforts to keep pace with global developments by adopting a technology-based economic model. The study also recommended promoting digital citizenship and instilling its culture.

What Distinguishes the Present Study from Previous Studies:

With respect to the study setting, the present study is analytical, econometric, and applied. With respect to the field of application, the descriptive–analytical approach is adopted as the most suitable for examination and analysis. The sample includes an exploratory study of Algeria. In terms of aims, previous studies addressed the topic in general terms and linked it to other variables related to intellectual property and digital transformation. In contrast, the present study relies on global indices for Algeria. This study differs from previous studies in that it examines the relationship between the independent and dependent variables and the statistical significance of the effect.

I. Theoretical Framework

1. Concept of Intellectual Property:

Intellectual property is defined as everything related to the creations of the human mind, such as inventions, literary and artistic works, slogans, symbols, and designs used in commerce. It is also described as a direct authority granted by law to a person over all the products of their intellect and thought, conferring exclusivity and the right of enjoyment over the financial returns generated by ideas, without dispute or objection from others (Fellahi, 2022–2023, p. 06). The World Trade Organisation defines intellectual property as the rights granted to individuals over the products of their intellectual creativity. The Egyptian Centre for Intellectual Property and Information Technology defines it as everything produced by the human mind. These ideas are, namely, transformed or embodied in tangible forms that can be protected. These include intellectual and mental creations, innovations and inventions, trademarks, drawings and models, integrated circuit designs, plant varieties, and authors' rights (Ben Aïcha Nour Eddine, 2022–2023, p. 11).

Intellectual property is also defined as a legal term referring to what the human mind produces in terms of innovative ideas that are translated into tangible objects, encompassing all rights resulting from human intellectual activity in artistic, literary, scientific, industrial, and commercial fields (Al-Aybi, March 2018, p. 63). Intellectual property further denotes an authority granted to a person over an intangible object related to thought and intellectual output. The concept of intellectual property has also been defined as a human right over one's scientific, literary, artistic, and technical production, enabling the individual to benefit from its material and moral outcomes, to freely dispose of it, to assign it, and to exercise exclusivity over it. The innovator has the exclusive right over their scientific output and may use their invention or literary work with or without remuneration and benefit from it through all possible means (Kalthoum, 2020–2021, p. 06).

2. Concept of Digital Transformation:

The term *digital transformation* has become highly prevalent among researchers, experts, and relevant consultants in recent years, given its paramount importance for organisational change driven by technological developments. It refers to the use of digital technologies to create value and change the manner and model of work, resulting in a fundamental, substantive transformation in an organisation's operations, such as the development of new products and strategies. Thus, digital transformation constitutes a radical change within the organisation and an unusual impact on strategies and organisational structures (Khadija, June 2024, p. 155).

Digital transformation within an organisation is defined as an organisational shift towards big data, analytics, cloud computing, mobile technologies, and social media platforms. While organisations continuously transform and evolve in response to a changing business landscape, digital transformation involves changes grounded in digital technology, leading to distinctive shifts in business processes

and the creation of value. It is also defined as encompassing both the digitisation of processes, with a focus on efficiency, and digital innovation, with a focus on enhancing existing physical products with digital capabilities (Jamal, 2023–2024, p. 04). It has further been defined as an organisation's use of digital technologies to manage its work, services, and activities; to process and analyse its data; to communicate among its members, including administrators and employees; and to conduct transactions entirely electronically. All of this must be undertaken within a secure technical or digital environment based on protected databases. In addition, digital transformation is broader and deeper than mere documentation or the electronic conversion of available intellectual content into a digital form (Taybi, 2023–2024, p. 25).

3. Challenges Facing Digital Transformation and Intellectual Property in Algeria:

Weak digital infrastructure (constraints on technology transfer):

Algeria suffers from an apparent lack of infrastructure to support digital transformation. This is reflected in weak internet communication networks and high data costs, which hinder universal access to digital services.

Lack of human competencies (insufficient resources dedicated to research and development):

A shortage of specialised expertise in technical fields and digital technology constitutes a significant challenge, as Algeria needs to develop and qualify additional human capacities capable of leading and implementing digital transformation projects.

Legislative challenges (legislative and institutional delays):

Existing laws and legislation require updating to align with the requirements of the digital era. This includes protecting personal data, safeguarding intellectual property rights, and establishing legal frameworks that support the digital economy.

Cultural resistance and hesitation in adoption (difficulty of practical implementation):

Certain entities, particularly in rural areas, face difficulties in accepting digital technology because of cultural resistance or a lack of awareness of its importance. This hesitation slows the pace of digital transformation and limits its spread.

Cybersecurity (weak legal awareness):

Cybersecurity poses a significant challenge amid the growing risk of cyberattacks. This requires strengthening the digital security infrastructure and developing effective strategies to protect data and information.

4. The Current State of Digital Transformation and Intellectual Property in Algeria:

Government strategies:

The Algerian government is making considerable efforts to promote digital transformation and intellectual property through diverse strategies to develop digital infrastructure, improve internet connectivity, and modernise digital management systems. These efforts seek to enable institutions and various sectors to benefit more effectively from digital technology.

Targeted sectors:

Digital transformation in Algeria focuses on a range of vital sectors, including government services, health, education, financial services, and electronic commerce. These efforts aim to improve the quality of services provided and to enhance innovation within these fields.

Level of progress:

Despite governmental initiatives and strategies, Algeria continues to face significant challenges in terms of digital transformation and intellectual property. This is reflected in the low level of technological integration in specific sectors compared with other countries, which hinders tangible progress in this field (Ben Ahmed, 2025, p. 507).

II. Measuring Intellectual Property in the Context of Algeria's Digital Transformation over the 2015–2022 Period

1. Study model and variables:

To examine intellectual property in the context of Algeria's digital transformation, annual time series data for the period 2015–2022 were used. Data for the Global Innovation Index of the World Intellectual Property Organisation and the Huawei Global Connectivity Index for Algeria were obtained from the Directorate of Statistics, Studies, and Foresight (2022) reports.

The study variables are denoted as follows:

GCI: Huawei Global Connectivity Index for Algeria.

IPI: Global Innovation Index of the World Intellectual Property Organisation for Algeria.

2. Results Analysis:

Table 1: Descriptive Statistics

Variable	Mean	Standard deviation	N
GCI	23.4033	1.92991	6
IPI	27.6667	3.77712	6

Source: SPSS v26 output.

The table above presents descriptive statistics, indicating a sample size of 6. The arithmetic means for Algeria's internet connectivity index and the intellectual property innovation index are 23.4033 and 27.6667, respectively. The standard deviations of the variables are 1.92991 and 3.77712, respectively. These variables were entered into the regression model as the dependent and independent variables.

Table 2: Correlation Matrix

	GCI	IPI
Pearson correlation		
GCI	1.000	.624
IPI	.624	1.000
Sig. (one-tailed)		
GCI	.	.093
IPI	.093	.
N		
GCI	6	6
IPI	6	6

Source: SPSS v26 output.

The table above shows the correlation matrix for the regression model's variables. The Pearson correlation coefficient between the internet connectivity index and the intellectual property innovation index for Algeria is 0.624, with a significance level smaller than 0.01. In contrast, the lowest correlation coefficient between them is also 0.624, with a significance level smaller than 0.01.

Table 3: Variables Entered/Removed

Model	Variables entered	Variables removed	Method
1	IPI	.	Enter

Note. Dependent variable: GCI. All the requested variables were entered.

Source: SPSS v26 output.

The table above shows the variables entered into the regression equation: the Huawei Global Connectivity Index for Algeria (GCI) is the dependent variable, and the World Intellectual Property Organisation Global Innovation Index for Algeria (IPI) is the independent variable. The analysis did not exclude any variables, and the model used econometric regression.

Table 4: Model summary (Pearson's correlation coefficient)

Model	R	R ²	Adjusted R ²	Standard error of the estimate
1	.624	.390	.237	1.68561

Note. Predictors: (Constant), IPI. Dependent variable: GCI.

Source: SPSS v26 output.

The table above presents the Pearson's correlation coefficient between the dependent and independent variables, which is moderate at 0.624. The coefficient of determination (R^2) is 0.390, and the adjusted R^2 is 0.237, indicating that the independent variable explains 23.7% of the variance in the Huawei Global Connectivity Index for Algeria.

Table 5: ANOVA Results

Model	Sum of squares	df	Mean square	F	Sig.
1 Regression	7.258	1	7.258	2.554	.185
Residual	11.365	4	2.841		
Total	18.623	5			

Note. Dependent variable: GCI. Predictors: (Constant), IPI.

Source: SPSS v26 output.

The table above presents the ANOVA results for testing the significance of the regression. The Sig. The value is 0.185, which is less than 0.01; therefore, the null hypothesis is rejected, and the alternative hypothesis is accepted, indicating that the regression is statistically significant. Accordingly, the independent variables affect the dependent variable, and the dependent variable can be predicted from them.

Table 6: Standardised and Unstandardised Regression Coefficients

Model		Unstandardised coefficients	Standard error	Standardised coefficients	t	Sig.	Collinearity statistics	
		B		Beta			Tolerance	VIF
1	(Constant)	32.228	5.564		5.792	.004		
1	IPI	−0.319	0.200	0.624	−1.598	.185	1.000	1.000

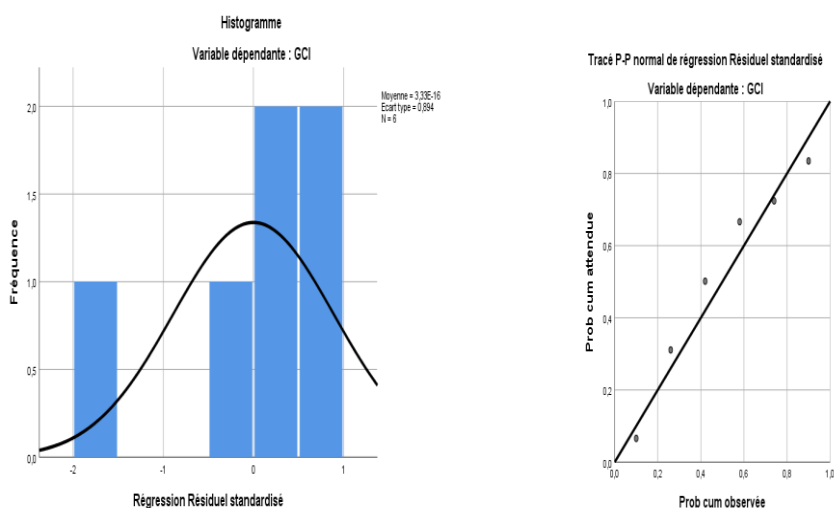
Note. Dependent variable: GCI.

Source: SPSS v26 output.

The table above presents the standardised and unstandardised regression coefficients, the standard error, the t test value and its p value (statistical significance), as well as the variance inflation factor (VIF) and tolerance values.

Tolerance $\times$ 1 = VIF. These results indicate that there is no multicollinearity problem among the variables, as the variance inflation factors are less than 3. The table also helps obtain the regression equation.

Predicted (JS) = 0.624(SIIP) + 0.624−(SIIP) + e.

Figure 1: Results of the Residual Distribution Test and Data Clustering

Source: SPSS v26 output.

The figures above show the normality of the residual distribution and the clustering of the data around the straight line. Accordingly, the residuals follow a normal distribution, a condition for conducting regression analysis.

Conclusion:

This study examined intellectual property in the context of Algeria's digital transformation over the period 2015–2022, drawing on econometric multiple regression analysis. The Huawei Global Connectivity Index for Algeria was used as the dependent variable, with the World Intellectual Property Organisation's Global Innovation Index as the independent variable. Prior to this, the study reviewed previous studies and certain theoretical concepts related to the study variables. The following results were reached:

- There is a positive relationship among the study variables.
- The regression model is statistically significant, meaning that the independent variables affect the dependent variable.
- A statistically significant effect exists between the independent variable and the dependent variable.
- The absence of multicollinearity among the study variables.
- Digital transformation contributes to the optimal reduction in human effort (intellectual property).
- Changing the method and model of work through digital transformation.

Accordingly, the null hypothesis is rejected, and the alternative hypothesis is accepted.

In light of the above results, the following recommendations are proposed:

- Intellectual property is among the most important resources of any organisation.
- Digital transformation constitutes an economic asset.
- Adopting and implementing digital transformation strategies.
- Ensuring rigorous information security as a result of the use of technology.

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