The Contribution of Information Technology in Reducing Time Wasters Using the PLS-SEM Methodology: A Perspective from the Professors of the Faculty of Economics at the Universities of M'sila and Bordj Bou Arreridj

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Abstract:

The study investigated how various dimensions of information technology—hardware, professional email, and internet-contribute to reducing time wasters, based on insights from professors at the Faculty of Economics in the Universities of M'sila and Bordj Bou Arreridj. A questionnaire was distributed to a random sample of 56 participants, and data analysis was conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM) with Smart-PLS4 to test the proposed hypotheses. The results indicated a high level of awareness among respondents about the use of information technology, but a moderate level of time wastage. Notably, the hardware dimension was found to significantly reduce time wastage, while professional email and internet showed no significant effect in achieving time efficiency from the professors' perspective.

Keywords: *Hardware; Professional Email; Internet; Time Wasters.*

1. INTRODUCTION

Technology has become an integral part of the modern world. The revolution of the Internet and intranet has changed the way businesses are carried out worldwide. As a result, rapid technological change helps key

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stakeholders in organizational growth and efficiency in the long term. (Yuvaraj & Suganthiya, 2016)

On the other hand, time management is an important topic that has attracted the attention of many pioneers of modern management. Numerous studies have consistently shown the damaging effects of ineffective time management on job performance. Tang and Vandenberghe explain that requests over an individual's available resources contribute to adecrease in overall work performance and improve performance through increased stress. (Zyoud, 2024, p. 2)

Leverage technology as one of the most powerful tools to improve the efficiency and quality of work for employees (Eljhani & Ameen, 2020, p. 7). The problem of wasting time casts a shadow on the ability of professors to perform their duties at Algerian universities, leading to a waste of time, resources and human effort. This inefficiency leads to increased costs, lower quality and rates of performance, and failure to achieve educational goals.

Problem Statement: To what extent does information technology contribute to reducing time wastage from the perspective of professors at the Faculty of Economics at the University of M'sila and the University of Bordj Bou Arreridj?

Based on the problem statement and research questions, the following hypotheses can be formulated:

- **(H1):** There is no statistically significant impact at a significance level ($\propto \leq 0.05$) of the hardware dimension on reducing time wastage from the perspective of economics professors at the Universities of M'sila and Bordj Bou Arreridj.
- **(H2):** There is no statistically significant impact at a significance level ($\propto \leq 0.05$) of the use of professional email on reducing time wastage from the perspective of economics professors at the Universities of M'sila and Bordj Bou Arreridj.
- **(H3):** There is no statistically significant impact at a significance level ($\propto \leq 0.05$) of the use of the internet on reducing time wastage from the perspective of economics professors at the Universities of M'sila and Bordj Bou Arreridj.

The importance of this study stems from the significance of its variables,

as it addresses two highly relevant topics in our current time. This research paper is also important due to the limited number of studies, both in the Arab world generally and in Algeria specifically, that explore the relationship between the use of information technology and the reduction of time wastage, especially among university professors.

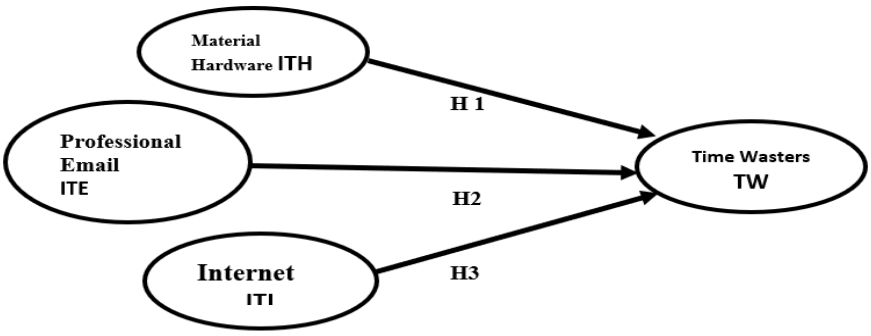
This research paper aims to:

- Identify the various applications of information technology and its areas of use within Algerian universities, represented by the Universities of Bordj Bou Arreridj and M'sila.
- Examine the nature of time wastage among university professors and understand its causes.
- Explore the relationship between the use of information technology and the reduction of time wastage among university professors.

Research Methodology: In conducting this study, the researchers employed the descriptive-analytical method, which involves describing and analyzing the phenomenon to uncover its aspects and confirm the extent of its presence and the level of correlation between its variables.

Study Model: Based on previous studies, three dimensions were selected for the independent variable, information technology (hardware, professional email, internet), with time wastage as the dependent variable. The following figure illustrates the proposed model for the study.

Fig.1 Proposed Study Model



Source: Prepared by the researchers based on previous studies

Previous Studies:

The studies you summarized each examine time management challenges in different contexts, focusing on how time is either optimized or wasted due to various organizational, technological, and personal factors.

Amel muftah and Mohamed chikhi (2024): This study aims to determine the impact of information technology in improving the performance of higher education institutions from the point of view of faculty at Bright Star University. For statistical analysis, researchers used the approach using structural modelling, a questionnaire model was distributed to the study group by taking a random sample. The study found several results, the most important of which: all dimensions of information technology (infrastructure, information systems, IT requirements) were high, and institutional performance at Bright Star University was high.

Salma Amara (2018): Amara's research assesses how ICT impacts time management within Algeria Post. The study finds a positive correlation, suggesting
that ICT can enhance efficiency and time management practices, evidenced by data
collected from Algeria Post's Oum El Bouaghi branch.

Boubaker Bousalem and Rahima Ghodbane (2017): This study explores time management in the context of social media, identifying both its potential to aid organizational goals and its pitfalls, particularly in promoting time-wasting behaviors due to social media accessibility. The study discusses how the lack of technological control complicates time management, making this a pressing issue across professional and personal settings.

Amer Al-Qaray (2016): This study provides an in-depth look at time management obstacles in Saudi universities, with Najran University as a model. It highlights that organizational inefficiencies, such as ambiguous roles and lack of order, are significant time wasters. Recommendations emphasize improving recruitment, assigning quality assurance tasks, and using faculty expertise in time management to enhance organizational effectiveness.

2. Theoretical Framework

2.1 Concept of Information Technology

Definition of Technology: The term "technology" (Technologie) is one that faces much ambiguity and interpretation. Some use it as a synonym for "technique" (Technique), while others see a clear distinction between the two. The origin of the word "technology" can be traced back to the Greek term Technology, which comprises two parts: Techno, meaning craft, skill, or art, and logy, meaning science or study. Therefore, technology signifies

the science of performance or application and is considered the science of industrial operation (Seirafi, 2009, p. 13).

Terminologically, views and definitions vary on finding an exact term that fully captures the technology concept. Charles Perow defined it as "the actions an individual performs on something, using tools or mechanical devices, or without them, to bring about a change in that thing (Salim, 2005, p. 96).

We can distinguish between technology and technique by considering that technology encompasses all tangible and intangible resources, such as software, aimed at saving the effort and time needed to complete tasks, while technique represents the method or approach through which tasks are executed.

Definition of Information Technology: The concept of information technology varies widely, as scholars and researchers offer diverse definitions that reflect their unique scientific backgrounds and intellectual perspectives.

Information technology is defined as the devices, equipment, and methods used by individuals to obtain audio, visual, and digital information, as well as to process this information by recording, organizing, arranging, storing, possessing, retrieving, displaying, reproducing, broadcasting, and delivering it in a timely manner to those who request it (Amari, 2016/2017, p. 22).

It can also be defined as an organization's resources used to manage essential operations and perform core tasks, including computers, communication systems, and software operations, enabling managers to utilize information effectively.

Another definition describes it as an integrated array of electronic tools that facilitate the strategic and operational management of institutions by enabling them to manage information, functions, and processes and to communicate effectively with stakeholders (Alwan, 2016, p. 176).

Characteristics of Information Technology: Information technology has a set of defining characteristics, the most important of which are (Mbaraki, 2022/2023, p. 105):

- **Time Reduction**: Technology brings electronic spaces closer together. For example, the internet allows everyone to quickly access the

information and data they need, regardless of their geographical location.

- **Productivity Boost**: Effective and efficient use of information technology leads to increased productivity.
- **Flexibility**: The uses of information technology are diverse, reflecting the various ways we can utilize it effectively and efficiently.
- **Automation**: Referring to speed, compactness, and lower cost, automation is one of the main advantages of information technology, marked by continuous improvement in speed and memory capacity.
- **Bridging Distances**: It is now possible to transfer information instantly between any two points in the world.
- **Artificial Intelligence**: The primary feature of information technology is

  enhancing knowledge and strengthening user training skills for inclusiveness and controlled access to information.
- **Transferability**: The ability to transfer information from one medium to another, such as converting an audio message into a printed or readable message.
- **Connectivity**: Refers to the possibility of connection between various communication devices.
- **Interactivity**: Users, whether individuals, institutions, or groups, act as both senders and receivers at the same time.
- **Decentralization**: This means the autonomy of information technology and its ability to operate continuously in all conditions.
- **Mobility**: Refers to users' ability to access services like laptops and mobile phones while on the move.

Components of Information Technology: The components of information technology can be summarized as follows (Attallah Jaloul, 2018/2019):

- **Technical Hardware and Software**: This represents the physical solid entities (computers and peripherals) composed of three main parts: input units, processing units, and output units. These devices perform multiple functions to facilitate work within an organization (Amel & Mohammed, 2024, p. 469). **Software**: Computers cannot perform tasks

without specific, sequenced instructions. Therefore, software is a fundamental component of information technology, running and supporting hardware to achieve the desired objectives of its use.

- **Internet and Communication Networks**: These are the means used to send and receive data and information, consisting of stations located in different places and interconnected by media that enable users to send and receive data using long-distance communication technologies.
- **Procedures**: This includes a set of instructions on integrating hardware, software, and networks to process data and generate outputs.

In this study we will focus on hardware, professional email, internet.

Importance of Information Technology: Information technology holds significant importance in our current era, marked by rapid change and continuous innovation. One of the key aspects of this technology is its contribution to reducing uncertainty in information and increasing trust in its role. It has also improved the quality of information flow to institutions. Several advantages highlight the importance of information technology, including (Hafsi & Hawas, 2020, p. 19):

- Improving Productivity and Operational Efficiency
- Enhancing Creativity and Innovation and Countering External Threats
- Supporting and Enhancing Decision-Making Processes
- Improving and Activating Communication within the Organization
- Formulating and Implementing Organizational Strategy
- Making Communication Faster, More Efficient, Effective, and Cost-Effective
- Technology can be used to automate various tasks at work; this automation save time. (Yuvaraj & Suganthiya, 2016, p. 454)

2.2 Time Wasters:

Many organizations and agencies, especially in developing countries, suffer from significant time waste, whether intentionally or unintentionally. Experts and researchers have attempted to define and categorize time wasters, and it has been agreed that time wasters include anything that hinders the effective and successful achievement of goals. They are defined as anything that causes time to pass without productive or economic accomplishment, essentially without work or output.

A study conducted by Michael Beuf in 1980 highlighted several causes of time waste, which include: telephone interruptions, unexpected visitors, scheduled and unscheduled meetings, crises, lack of priorities, goals, and deadlines, ineffective delegation, overlapping routines and details, attempting to accomplish too much too quickly, unrealistic time estimates, unclear or absent communications or guidelines, inadequate or inaccurate information, indecision, procrastination, abandoning tasks before completion, lack of self-discipline, unstable responsibilities and authority, inability to say 'no,' cluttered and disorganized offices (Farag & Sabry, 2003, p. 195).

Another study grouped common time wasters into forty (40) specific areas and categorized them into seven (07) groups based on management functions, as defined by "McKinsey" (Zaidan, 2011, p. 141):

- **Planning-Related Factors**: Lack of clear goals for effective time management and inadequate prioritization of available time. Other issues include the absence of daily plans, reliance on "fire-fighting" (crisis management) due to weak forecasting, inefficient subordinate performance, and imbalance in time allocation relative to workload, often leading to either excess or insufficient time for tasks, or attempting too many tasks at once.
- **Organizational Factors**: Disorganization, lack of task distribution discipline, and time wasted on redundant or unnecessary tasks, leading to workload imbalance and increased stress. Additionally, unclear responsibilities and authority, multiple supervisors for an employee, routine, excessive paperwork, and disordered office files result in significant time loss.
- **Employment-Related Factors**: Mismatches between subordinates and their roles, lack of adequate training, overstaffing or understaffing, and the presence of employees who create issues or challenges.
- **Control-Related Factors**: Frequent interruptions, such as phone calls, inability to say "no" when necessary, lack of effective control standards and techniques, and excessive visits, especially unexpected ones. Excessive control can also waste time when standards are absent, along with a lack of monitoring reports.

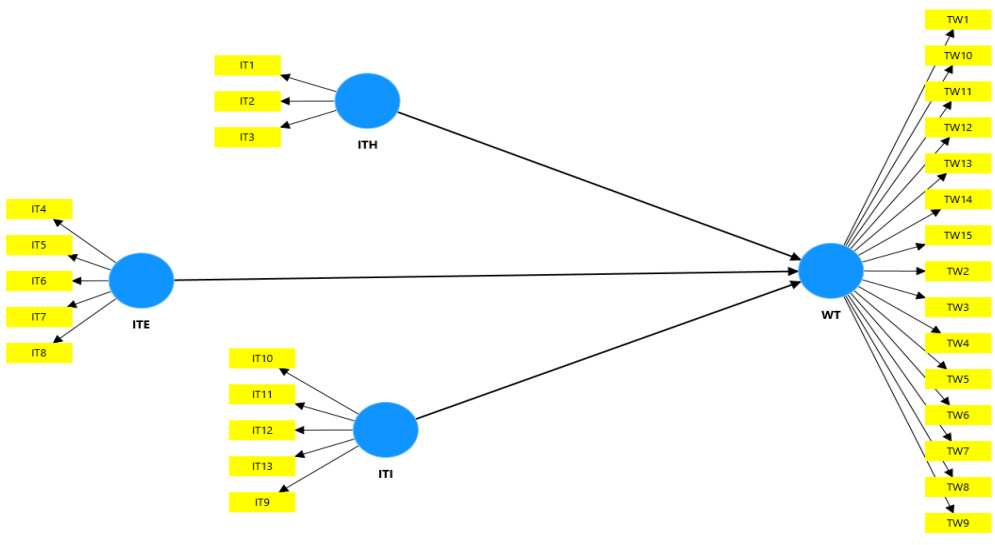
- **Decision-Making Factors**: Hasty, impulsive decision-making can result in impractical or ineffective decisions, negatively impacting time. Furthermore, hesitation, procrastination, and indecision due to fear of failure are significant time wasters. Lastly, resorting to committees for decision-making when unnecessary is also considered a time-waster.

3. Field Study

3.1 Study Population and Sample: The study population consisted of professors from the universities of M'sila and Bordj Bou Arreridj. A random sample of professors from the Faculty of Economics at both universities was selected. An electronic questionnaire was distributed to 200 professors, of which 56 valid questionnaires were returned for analysis.

3.2 Study Methodology and Model Diagnosis: The Partial Least Squares Structural Equation Modeling (PLS-SEM) methodology was employed using the Smart-PLS4 software. The theoretical model included a set of causal relationships to explain the reduction of time wasters, based on four latent variables with a reflective measurement model. Three independent latent variables (hardware, professional email, internet) were considered as dimensions of information technology, in addition to the dependent variable,

Fig.2. Estimation of the PLS Path Model for Study Variables



Source: Prepared by the researchers based on the outputs of SmartPLS4

time wasters. The manifest variables relate to the statements that comprise the four latent variables. The model was estimated in the software, as illustrated in the following figure.

3.3 Descriptive Analysis of Study Variables

To estimate the level of the variables, we use a three-point scale (low, medium, high), calculated based on the range. The results are as follows: a low level when the average falls within the range [1 – 2.33], a medium level when the average is within the range [2.34 – 3.67], and a high level when the average is within the range [3.68 – 5]. The following table shows the descriptive analysis results of the study variables:

Table N°(01): descriptive analyse

Items	Mean	Scale min	Scale max	Standard deviation	الدرجة
IT1	3.10	1.00	5.00	1.26	Medium
IT2	3.33	1.00	5.00	1.10	Medium
IT3	3.55	1.00	5.00	0.96	Medium
ITH	3.32			1.10	Medium
IT4	4.57	2.00	5.00	0.67	High
IT5	4.21	1.00	5.00	0.97	High
IT6	4.58	3.00	5.00	0.56	High
IT7	4.23	1.00	5.00	0.88	High
IT8	4.30	3.00	5.00	0.65	High
ITE	4.37			0.74	High
IT9	4.19	2.00	5.00	0.74	High
IT10	4.37	3.00	5.00	0.61	High
IT11	4.48	4.00	5.00	0.50	High
IT12	4.41	3.00	5.00	0.52	High
IT13	4.58	3.00	5.00	0.56	High
ITI	4.40			0.58	**High**
IT	4.03			0.80	**High**
TW1	3.32	1.00	5.00	1.12	Medium
TW2	2.46	1.00	4.00	0.96	Medium
TW3	2.57	1.00	4.00	0.92	Medium
TW4	2.98	1.00	5.00	1.06	Medium
TW5	3.12	1.00	5.00	0.90	Medium
TW6	3.55	1.00	5.00	1.05	Medium
TW7	3.62	1.00	5.00	1.11	Medium
TW8	3.00	1.00	4.00	0.70	Medium
TW9	3.60	1.00	5.00	1.19	Medium
TW10	3.17	1.00	5.00	1.16	Medium
TW11	3.07	1.00	5.00	1.05	Medium
TW12	2.82	1.00	5.00	0.98	Medium
TW13	3.08	1.00	5.00	1.10	Medium
TW14	2.67	1.00	4.00	0.94	Medium
TW15	2.73	1.00	4.00	0.89	Medium
TW	3.04			1.01	**Medium**

Based on the results shown in the table above, it is evident that the level

of awareness of the professors at the Universities of M'sila and Bordj Bou Arreridj in the Faculty of Economics regarding the variable of information technology scored highly, with an average value of 4.03, which falls within the range [3.68 – 5]. This is accompanied by a standard deviation of 0.80, indicating low variance among the sample responses. This is attributed to the moderate level of physical equipment, with an average value of 3.32, falling within the range [2.34 – 3.67]. Additionally, the high levels of professional email use and internet access scored averages of 4.37 and 4.40, respectively, which fall within the range [3.68 – 5]. This suggests that the professors studied have a high level of awareness regarding the importance of information technology, with the university providing physical equipment and properly using professional email. The provision of internet access further aids professors in performing their functions related to the university to which they belong, whether in teaching, scientific research, or community service.

The dependent variable, time-wasters, had an average value of 3.04, which falls within the range [2.34 – 3.67]. This indicates that the professors have a moderate level of understanding and awareness of time-wasters in their work, whether in pedagogical or administrative areas.

3-4 Study Model Evaluation

3-4-1 Assessment of Reflective Measurement

A. Construct Reliability and Validity

Table N⁰(01): Construct reliability and validity

Constructs	Items	Outer loadings	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Material Hardware ITH	IT1	0.084				
	IT2	0,881				
	IT3	0,687	0,718	0,793	0,836	0,631
Professional Email ITE	IT4	0,879				
	IT5	0,892				
	IT6	0,907				
	IT7	0,868				
	IT8	0,592	0,891	0,950	0,919	0,699
Internet ITI	IT9	0.711				
	IT10	0,884				
	IT11	0,891				
	IT12	0,864				
	IT13	0,558	0,848	0,891	0,891	0,628
Time Wasters TW	TW1	0.621				
	TW2	0,323				
	TW3	0,501				
	TW4	0,684				
	TW5	0,554				
	TW6	0,681				
	TW7	0,694				
	TW8	0,736				
	TW9	0,564				
	TW10	0,783				
	TW11	0,776				
	TW12	0,292				
	TW13	0,554				
	TW14	0,524				
	TW15	0,733	0,892	0,910	0,898	0,383

Source: Prepared by the researchers based on the outputs of SmartPLS4

From the table and figure, it is evident that all saturation values for the items in the information technology dimensions (Physical Equipment, Professional Email, Internet) scored above 0.7 for each item, except for three items (IT3, IT8, IT13). Additionally, both Cronbach's alpha and composite reliability coefficients were greater than 0.7. The Average Variance Extracted (AVE) values for all information technology dimensions were also above 0.5, indicating that each latent variable explains more than half of the variances in its indicators.

As for the saturation values of the time-wasting variable, they showed varying values, with some exceeding 0.7 (TW8, TW10, TW11, TW15), while the saturation values of other items were below 0.7. Despite Cronbach's Alpha and the Composite Reliability (CR) being greater than 0.7, the Average Variance Extracted (AVE) scored a value of 0.383, which is less than 0.5 and thus unacceptable.

Since there are saturation values below 0.7, we eliminate items with values lower than 0.4, then observe the changes in Cronbach's Alpha, the reliability coefficient, and the AVE. We then gradually remove values below 0.7 until the AVE stops increasing.

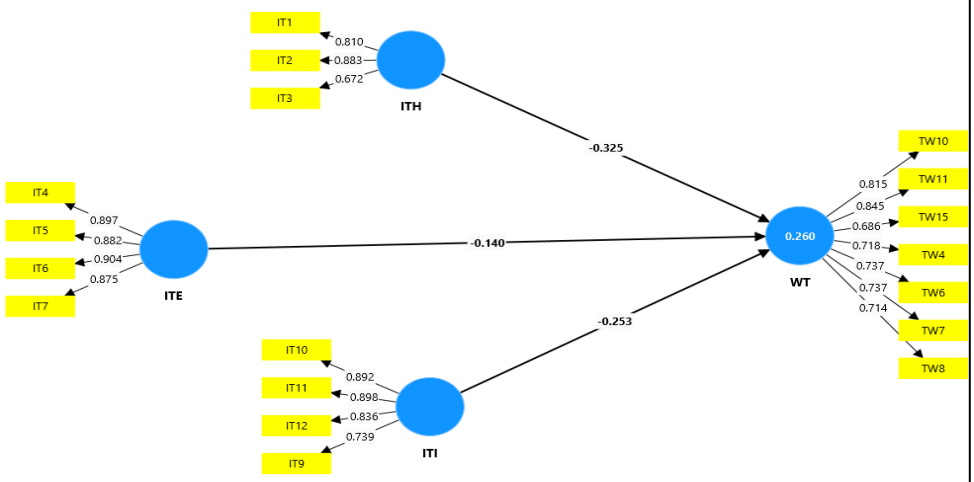
In the end, items (IT8, IT13) from the information technology dimension and items (TW1, TW2, TW3, TW5, TW9, TW12, TW13, TW14) from the time-wasting variable were removed. The final results after deletion are shown in the following table.

Table N⁰(03) :The reliability and convergent validity tests after modification

Constructs	Items	Outer loadings	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Material Hardware ITH	IT1	0.084	0,718	0,801	0,834	0,629
	IT2	0,881				
	IT3	0,687				
Professional Email ITE	IT4	0,879	0,913	0,937	0,938	0,791
	IT5	0,892				
	IT6	0,907				
	IT7	0,868				
Internet ITI	IT9	0.711	0,863	0,872	0,908	0,712
	IT10	0,884				
	IT11	0,891				
	IT12	0,864				
Time Wasters TW	TW4	0,684	0,878	0,914	0,901	0,566
	TW6	0,681				
	TW7	0,694				
	TW8	0,736				
	TW10	0,783				
	TW11	0,776				
	TW15	0,733				

Source: Prepared by the researchers based on the outputs of SmartPLS4

Fig N⁰(04): Measurement Model Before Modification



Source: Prepared by the researchers based on the outputs of SmartPLS4

The table and figure above indicate that, based on the data, all saturation values for the items in the dimensions of information technology (independent variables) and the dependent variable, time wasters, were greater than 0.7, except for two items (IT3, TW15), which were close to 0.7 and were accepted due to meeting reliability and convergent validity requirements. Both Cronbach's Alpha and Composite Reliability were greater than 0.7, indicating the reliability of the items within the dimensions of information technology and the time wasters variable. Additionally, the Average Variance Extracted (AVE) values for all dimensions of information technology and the time wasters variable were above 0.5, indicating that each latent variable explains more than half of its indicator variances, thus confirming convergent validity.

B. Discriminant Validity

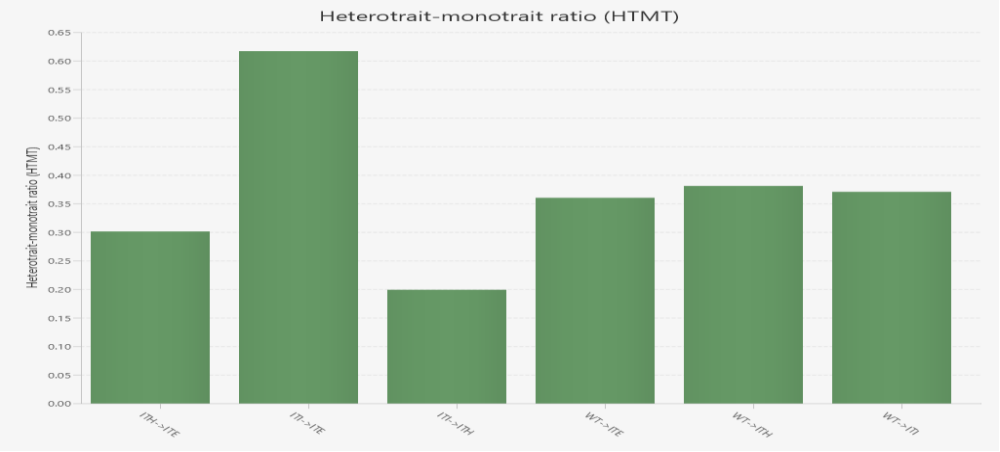
We test discriminant validity using three methods: Cross Loadings, Fornell-Larcker Criterion, and Heterotrait-Monotrait Ratio (HTMT) – Matrix. The following table illustrates this:

Table N⁰(04): Discriminant validity testing

Test / Indicaters		Cross loadings				Fornell-Larcker				HTMT			
		ITH	ITE	ITI	WT	ITH	ITE	ITI	WT	ITH	ITE	ITI	WT
Material Hardware ITH	IT1	**0,810**	0,149	0,008	-0,287	**0.793**				-			
	IT2	**0,883**	0,165	0,149	-0,382								
	IT3	**0,672**	0,248	-0,017	-0,168								
Professional Email ITE	IT4	0,267	**0,897**	0,335	-0,379	0.216	**0.890**			0.301	-		
	IT5	0,214	**0,882**	0,598	-0,294								
	IT6	0,285	**0,904**	0,485	-0,237								
	IT7	-0,008	**0,875**	0,545	-0,286								
Internet ITI	IT9	0,189	0,305	**0,739**	-0,308	0.082	0.539	**0.844**		0,199	0,617	-	
	IT10	-0,065	0,421	**0,892**	-0,234								
	IT11	0,051	0,518	**0,898**	-0,342								
	IT12	0,072	0,559	**0,836**	-0,286								
Time Wasters TW	TW4	-0,416	-0,201	-0,357	**0,718**	**-0.376**	**-0.376**	**-0.355**	**0,75**	0,381	0,360	0,371	-
	TW6	-0,206	-0,258	-0,065	**0,737**								
	TW7	-0,054	-0,228	-0,150	**0,737**								
	TW8	-0,072	-0,173	-0,212	**0,714**								
	TW10	-0,490	-0,332	-0,266	**0,815**								
	TW11	-0,202	-0,337	-0,336	**0,845**								
	TW15	-0,158	-0,231	-0,309	**0,686**								

Source: Prepared by the researchers based on the outputs of SmartPLS4

Fig N⁰(05) :HTMT testing



Source: **Prepared by the researchers based on the outputs of SmartPLS4**

The above table, related to the Cross Loadings test, shows that the item loadings for each concept (Information Technology Dimensions, Time Wasters) were highest within their respective concepts compared to other concepts. For instance, the loadings for the concept "Material Hardware" (IT1, IT2, IT3) took values of (0.810, 0.883, 0.672) respectively, which were higher compared to the other concepts (Professional Email, Internet, Time Wasters); thus, these indicators (items) are best placed within their respective concept (Material Hardware). The same analysis applies to other concepts,

confirming the discriminant validity of the measurement model through the Cross Loadings test.

The table above also demonstrates through the Fornell-Larcker criterion that all concepts represented by Information Technology dimensions and the Time Wasters variable show high values with themselves, which represent the (√AVE) values. These values range from (0.752-0.890), affirming that there is no overlap between concepts, and each concept represents itself, thus achieving discriminant validity by applying the Fornell-Larcker test.

As observed from the above table and figure, all HTMT values for the study variables were within the allowable threshold; the HTMT values for the concepts were less than 85%, indicating a clear distinction between each concept and the others. This shows that the measurement model exhibits discriminant validity by applying the HTMT criterion.

We evaluated discriminant validity through three criteria, which demonstrated the measurement model's success in terms of reliability, convergent validity, and discriminant validity.

From the above, we have confirmed the reliability and validity (convergent and discriminant) of the indicators for various variables in the model, allowing us to proceed with the evaluation of the structural model.

3-4-2 Assessment of Structural Model

We evaluate the structural model by assessing the causal relationships between the exogenous latent variables and the endogenous latent variables. To assess these relationships, we go through several stages: examining linearity with the VIF coefficient, the coefficient of determination $\mathbf{R^2}$ the effect size $\mathbf{F^2}$, the predictive relevance $\mathbf{Q^2}$, and the goodness of fit **GOF** coefficient.

A. Collinearity statistics (VIF)

Table N⁰(05): Results of the Collinearity Problem Test

	VIF	**Tolerance**
ITH -> WT	1,051	0.96
ITE -> WT	1,471	0.68
ITI -> WT	1,412	0.71

Source: Prepared by the researchers based on the outputs of SmartPLS4

The table above shows that all VIF (Variance Inflation Factor) values for the different independent variables range between 1.051 and 1.47, which do not exceed the permissible threshold value of 5. Additionally, the Tolerance values range between 0.68 and 0.96, all of which are above the threshold value of 0.2. Therefore, we conclude that there are no multicollinearity issues among the different independent variables (physical equipment, professional email, internet) and the dependent variable (time wasters).

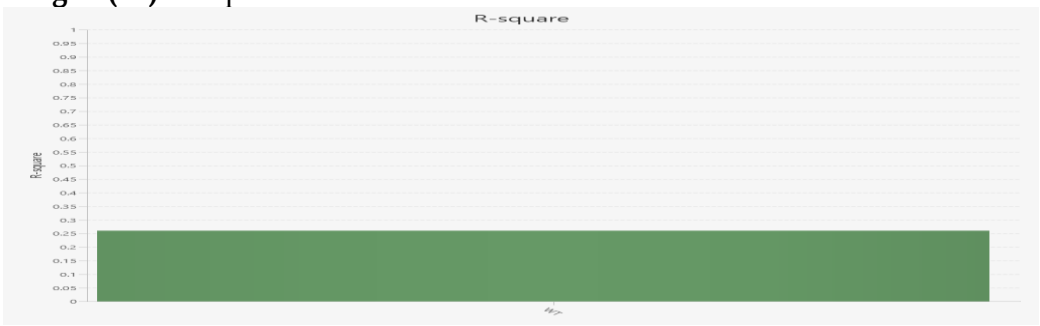
B. Quality criteria

B.1- R-square

Table N⁰(06): Results of the R-squared Coefficient

	R-square	**R-square adjusted**	**Result**
WT	**0,260**	**0,218**	**Weak**

Fig N⁰(06): R-squared Coefficient



Source: Prepared by the researchers based on the outputs of SmartPLS4

From the table and figure above, we can see that the **R square** coefficient for the endogenous latent variable (time wasters) has a statistically acceptable value of **0.260**, which falls within the range **[0.19-0.33]**. This indicates that the independent variables (physical equipment, professional email, internet) collectively explain the dependent variable (time wasters) weakly, with an explanatory power of **26%.**

B.2- Effect of size f square

According to Cohen's (1988) criterion, the effect size $\mathbf{F^2}$ is categorized as follows: values below 0.02 are considered unacceptable, values between 0.02 and 0.15 indicate a weak effect, values from 0.15 to 0.35 suggest a moderate effect, and values greater than 0.35 reflect a strong effect.

Table N⁰(07): Effect Size (f^2) Analysis

	f-square	**effect**
ITH -> WT	0,136	Weak
ITE -> WT	0,018	Not effect
ITI -> WT	0,061	Weak

Source: Prepared by the researchers based on the outputs of SmartPLS4

Based on the table above, we conclude that the impact on the latent internal variable (time wasters) was weak for both the hardware and internet dimensions, with effects of 0.136 and 0.061, respectively, as these values fall within the range [0.02 – 0.15]. As for the professional email dimension, the impact size was unacceptable, as the effect value was very weak at 0.018, below 0.02.

B.3 - Predictive Relevance Q^2 (Predictive Relationship)

The predictive relevance values derived from the **SmartPLS** software indicate the adequacy of the independent variables (exogenous constructs) in predicting the dependent variable (endogenous construct). This shows the quality of the empirical data regrouping with the assistance of the model. In this process, a distance called "D" is set, then all data points beyond this distance are removed. Parameters are estimated using the remaining data, and the process is repeated. The software only provides the value $\boldsymbol{Q^2_{inclded}}$ after which we extract $\boldsymbol{Q^2_{excluded}}$ by excluding one of the exogenous constructs. Then, we calculate Q^2 using the following formula: $\boldsymbol{Q^2 = 1 - \frac{\sum_D E_D}{\sum_D EO_D} = 1 - \frac{SS_E}{SS_O}}$

E: Sum of squared prediction errors, O: Sum of squared errors, D: Omission distance

It is estimated as follows: if (**Q2>0**), the model has predictive relevance. If (**Q2>0**), the model does not have predictive relevance.

Table N⁰(08): Results of the Predictive Relationship Indicator (q-squared)

	Q2= 1-(SSE/SSO)	**Q2= $\frac{Q^2_{inclded} + Q^2_{excluded}}{1 - Q^2_{inclded}}$**		
		ITH	**ITE**	**ITI**
TW	0.085	0.158	0.180	0.172

Source: Prepared by the researchers based on the outputs of SmartPLS4

Fig N⁰(08):Predictive Relevance Index (Q^2_included)

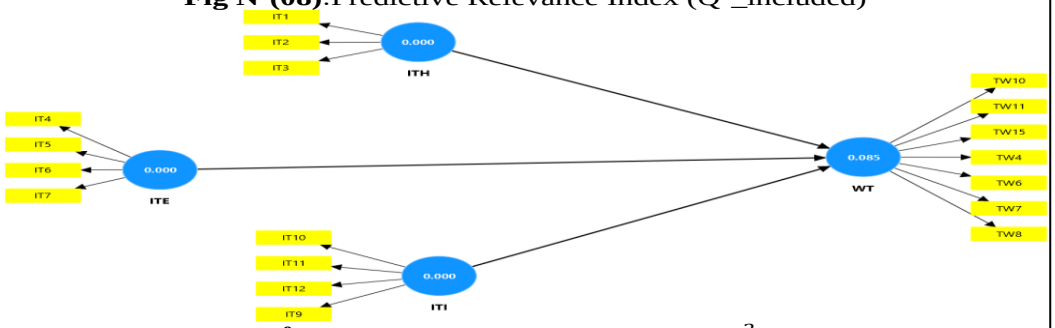


Fig N⁰(09) : Predictive Relevance Index $Q^2_{excluded}$

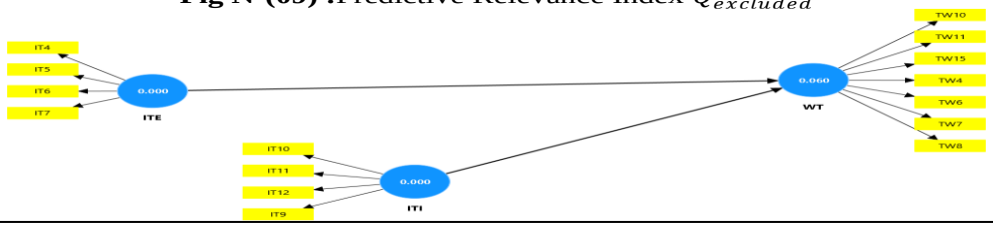


Fig N⁰(10) Predictive Relevance Index $Q^2_{excluded}$

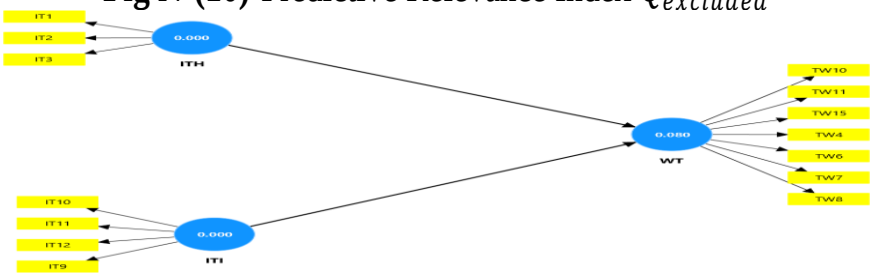
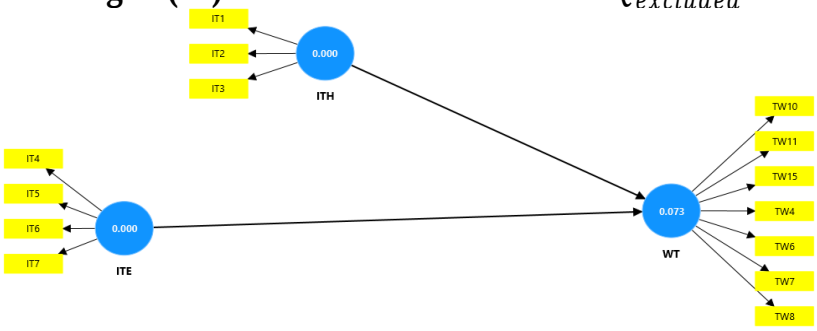


Fig N⁰(11): Predictive Relevance Index $Q^2_{excluded}$



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Source: Prepared by the researchers based on the outputs of SmartPLS4

The results from the table and figures above show that the **Q2** value is greater than zero for the latent internal variable "time wasters," with values

of (**0.158, 0.180, 0.172**). These values are greater than zero, indicating that the model has predictive relevance (significance).

B.4- Goodness-of-fit (GoF)

This indicator assesses the reliability of the study model, whether it is the measurement or structural model, by evaluating the model's quality and its fit with empirical data. The model is rated as follows: 1% indicates an unsuitable model, between 1% and 25% reflects a weak model, between 25% and 36% indicates a moderate model, and above 36% denotes a high-quality model.

Table N⁰(09): Goodness-of-fit (GoF) Indicator of Fit Quality

	R^2	AVE
TW	0.26	0.566
$GOF = \sqrt{AVE \times R^2}$	0.383	

Source: Prepared by the researchers based on the outputs of SmartPLS4

The table above shows that the model fit quality index is 0.383, or 38.3%, which exceeds 36%, indicating that both the proposed measurement model and structural model are of high quality.

After confirming the quality of the proposed model, both measurement and structural, the study hypotheses can be tested.

C- Hypothesis Testing

Using Smart-PLS4 and the SEM-PLS methodology, we tested the effect hypotheses for path analysis, focusing on the path coefficient (B) and the values of T-value and P-value, obtained from Smart-PLS by applying a subsample of 5000 through Bootstrapping, with a two-tailed hypothesis from the Path Coefficients window.

- **Path Coefficient (B):** Reflects the direction of the relationship between components, ranging from -1 to +1, where +1 indicates a strong positive relationship, 0 indicates a weak or no relationship, and -1 indicates a strong negative relationship.
- **T-value:** Indicates the significance of the relationship, with values of **T ≥ 1.96** being preferable.
- **P-value:** Significance level, where the relationship effect is considered statistically significant and acceptable if **p ≤ 0.05.**

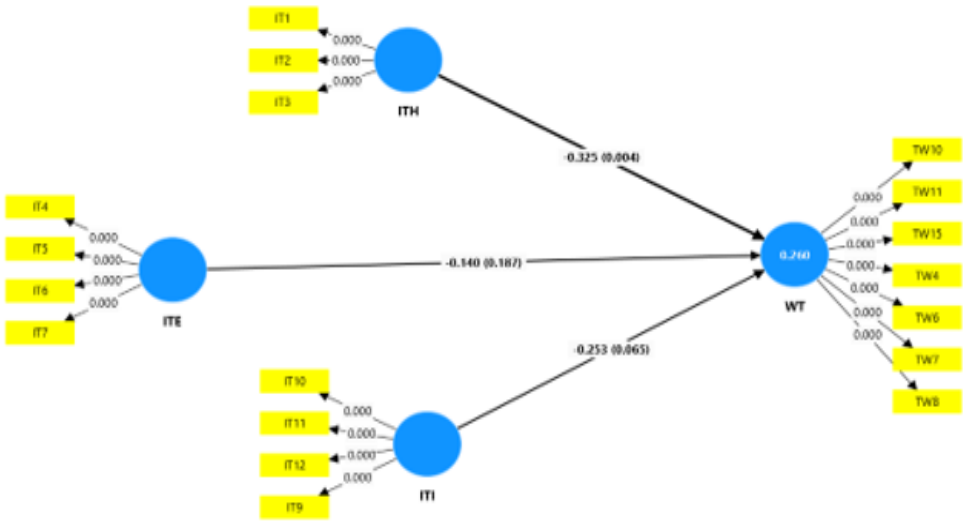
Table N⁰(010) Hypothesis testing

Variabel	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	2.5%	97.5%	Result
ITH -> WT	-0,325	-0,361	0,112	2,914	**0,004**	-0,549	-0,158	Supported
ITE -> WT	-0,140	-0,152	0,106	1,319	0,187	-0,365	0,050	Rejected
ITI -> WT	-0,253	-0,269	0,137	1,845	0,065	-0,498	0,036	Rejected

p**≤0.01, p*≤0.05 Bootstrapping= 5000

Source: **Prepared by the researchers based on the outputs of SmartPLS4**

Fig N⁰(12): Hypothesis testing



Source: Prepared by the researchers based on the outputs of SmartPLS4

The table and the figure demonstrate that there is an impact of the physical equipment dimension on reducing time waste. However, no impact was observed for either the professional email or internet dimensions on reducing time waste according to the study sample. The following explanation clarifies this:

The physical equipment dimension, labeled as **ITH,** shows a direct negative and weak impact with a value of (**B=-0.325**). The values (T-value= 2.914, P-value= 0.004) fall within the acceptable limits **(p≤0.05, T≥1.96**), with a confidence interval of **[-0.549, -0.158**] that does not include zero. This

indicates a statistically significant impact of the physical equipment dimension on reducing time waste among professors at the universities of Bordj Bou Arreridj and M'sila. Consequently, the null hypothesis H0 is rejected, and the alternative hypothesis is accepted, which states: There is a statistically significant impact at a significance level of **($\propto \leq 0.05$)** for the physical equipment dimension on reducing time waste from the perspective of economics professors at the universities of M'sila and Bordj Bou Arreridj. The professional email dimension, labeled as **ITE**, shows a direct negative and weak impact with a value of **(B=-0.140**). The values (**T-value= 1.319, P-value= 0.187**) do not fall within the acceptable limits (**p≤0.05, T≥1.96**), with a confidence interval of **[-0.365, 0.050**] that includes zero. This indicates that there is no statistically significant impact of the professional email dimension on reducing time waste among professors at the universities of Bordj Bou Arreridj and M'sila. Consequently, the null hypothesis **H0** is accepted, which states: There is no statistically significant impact at a significance level of **($\propto \leq 0.05$)** for the professional email dimension on reducing time waste from the perspective of economics professors at the universities of M'sila and Bordj Bou Arreridj.

The effect of the internet dimension (**ITI**) showed a direct, negative, and weak impact with a value of (**B=-0.253**), with (**T-value=1.319, P-value=0.187**), both of which fall outside the acceptable limits (**p≤0.05, T≥1.96**). The confidence interval **[-0.365, 0.050]** includes zero, indicating that the internet dimension does not have a statistically significant effect on reducing time waste among professors. Therefore, the null hypothesis H0 is accepted, which states: There is no statistically significant effect at the significance level **($\propto \leq 0.05$)** of the internet dimension on reducing time waste from the perspective of economics professors at the universities of M'Sila and Bordj Bou Arreridj.

4. CONCLUSION

The study reached several findings. It showed a high level of awareness of the information technology variable and a moderate level of awareness regarding time-wasting factors among university professors from the perspective of professors at the faculties of economics at the universities of M'Sila and Bordj Bou Arreridj. Additionally, there is a statistically

significant impact ($\propto \leq 0.05$) of physical equipment on reducing time waste according to the professors. However, there is no statistically significant impact at the same level of significance ($\propto \leq 0.05$) for the use of professional email or internet in reducing time waste among these professors.

To support this study's findings, several recommendations are proposed. Since physical IT equipment aids professors in minimizing time waste, universities should ensure the availability of computers and data show projectors in all departments and lecture halls, as well as make printers accessible throughout the semester, along with ongoing maintenance. Universities are also encouraged to keep up with advancements in this field by providing electronic boards and advanced printers to help professors complete their tasks efficiently and in less time. Additionally, emphasizing the importance of professional email in reducing time waste can be achieved by organizing seminars highlighting its advantages, such as access to paid programs for free, which aid in various pedagogical and administrative tasks. Lastly, it is essential to guide professors on the effective use of the internet for time management and encourage universities to hold workshops and training sessions on optimal time management through the use of IT and artificial intelligence in education and research.

5.Bibliographie

Alwan, N. R. (2016). The use of information and communication technology in tourism and travel companies and its impact on developing services offered. *Baghdad College Journal of Economic Sciences*(47).

Amari, A. (2016/2017). *The contribution of information technology in developing competencies: A case study of Aurès Mills in Batna.* University of Batna, Algeria.: Faculty of Economics.

Amel, M., & Mohammed, M. (2024). The impact of information technology on improving the performance of higher education institutions using constructive modeling (SEM): from the point of view of faculty of Bright Star University. *Journal of Academic Research*(28).

Attalah, J. (2018/2019). *The role of information technology in achieving the competitive advantage of an organization.* Algeria: University of Biskra.

Committee For The Corporate Governance Of Listed Companies. (1999). *REPORT CODE OF CONDUCT*. MILANO: Borsa Italiana S.p.A. Retrieved from www.borsaitalia.it

Eljhani, H., & Ameen, A. (2020). The Role of Information Technology in Libyan Organizations. *International Journal of Management and Human Science (IJMHS), 4*(1).

Farag, A. H., & Sabry, H. M. (2003). *Management of educational institutions.* Cairo: Alam Al-Kutub.

Hafsi , H., & Hawas, M. (2020). The importance of information technology in improving the organization's marketing performance. *Journal of Economic Dimensions, 10*(1).

Mbaraki, S. (2022/2023). *The impact of information technology on improving organizational performance from the perspective of the balanced scorecard: A case study of selected Algerian economic institutions (Doctoral dissertation).* Algeria: Faculty of Economic.

Salim, M. S. (2005). *Organizational theory: Structure and design.* Jordan: Wael Publishing House.

Seirafi, M. (2009). *Information technology management.* Egypt: Dar Al-Fikr Al-Jamie.

Yuvaraj, S., & Suganthiya, M. (2016). Impact of technology on human resource management. *International J. of Business Intelligence & Innovation, 4*, 459-456.

Zaidan, S. (2011). *Time and change management strategies.* Jordan: Dar Al-Manahij for Publishing and Distribution.

Zyoud, R. A. (2024). Factors Contributing to Time-Wasting Activities among Palestinian Nurses: A Cross-Sectional Study. *Journal of Nursing Management, 1*.