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Impact of Digitalization on the Performance of Human Resources in Listed Companies in Morocco

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Abstract: *The digital age has brought about significant upheavals in the functioning and structure of organizations worldwide. This article investigates the impact of digitalization on the performance of Human Resources (HR) within companies listed on the Casablanca Stock Exchange in Morocco. The adopted methodology is based on structural equation modeling. In this regard, a survey was conducted among the HR departments of 70 companies listed in Casablanca. The results show significant correlations between the implementation of digital technologies in HR processes and an improvement in the performance of these departments. This article highlights the importance of digitalization as a strategic lever to enhance the efficiency of HR functions while underscoring the unique challenges faced in the Moroccan context. These findings provide valuable insights for practitioners and decision-makers looking to optimize their HR strategies in the digital age.*

1. INTRODUCTION

The digital age has ushered in a plethora of changes and transformations to organizations around the globe. Digitalization, encompassing the integration and use of digital technologies, profoundly alters how businesses operate, simultaneously presenting opportunities and challenges (Brynjolfsson & McAfee, 2014). In this global context, Human Resources (HR) departments are not left behind. Historically focused on administrative and operational tasks, HR is now at the heart of these upheavals, striving to enhance their performance and add value to the organization (Stone et al., 2015).

Morocco, regarded as an emerging market with an active stock exchange in Casablanca, provides a unique setting for studying these dynamics. Listed companies, in particular, operate in an environment where shareholder expectations, corporate governance, and transparency are paramount. Consequently, understanding how digitalization impacts HR performance within these companies is of paramount importance (El Akremi et al., 2018).

This article aims to probe the impact of digitalization on the HR performance of companies listed on the Casablanca Stock Exchange. Drawing on a robust methodology based on structural equation modeling and a comprehensive survey, this research endeavors to highlight the consequences, opportunities, and challenges related to this digital shift in the Moroccan landscape.

In this regard, Structural Equation Modeling (SEM) is a multidimensional statistical approach that combines factor analysis and regression techniques to examine complex relationships between observed and latent variables (Bollen, 1989; Kline, 2011). This technique allows for the

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understanding of the validity of theoretical constructs while simultaneously evaluating a series of interdependent hypotheses related to the relationships between these constructs.

In the context of the impact of digitalization on HR performance, SEM takes on special significance. It helps ascertain whether the measured indicators accurately reflect the underlying concepts (latent variables) they are intended to represent, such as the different dimensions of "HR performance" (Hair et al., 1999). Moreover, it provides the ability to check if, for instance, the integration of digital technologies influences HR performance, considering other relevant variables (Byrne, 2010). Lastly, through various fit indices, SEM sheds light on the alignment between the theoretical model and the collected data (Hu & Bentler, 1999).

To this end, this article will be structured as follows: the second section will present a literature review concerning the impact of digitalization on the HR performance of listed companies. The third section will introduce the conceptual model and its hypotheses. The fourth section will showcase the results and discussion, and the fifth conclusion.

2. LITERATURE REVIEW

The digital transformation of businesses is a widely studied topic due to its significant implications for the management and performance of Human Resources (HR). Listed companies, often subject to the pressures of shareholders and regulators, may adopt a specific perspective on digitalization. Regarding theories on digitalization and HR, the theory of digital transformation, according to Kane et al. (2015), suggests that digital transformation is not limited to the adoption of digital technologies. It also encompasses cultural and operational transformation, with HR playing a pivotal role in this cultural shift. Similarly, Barney (1991), through his resource-based theory, posits that companies possessing rare, inimitable, and irreplaceable resources can gain a competitive edge. In the context of digitalization, HR competent and trained in new technologies can represent such a resource, as emphasized by Teece (2007).

From an empirical standpoint on the impact of digitalization on HR performance, Stone and Deadrick (2015) illustrated that adopting digital technologies can enhance HR productivity by automating various tasks and providing data-driven decision-making tools. Cappelli and Keller (2014) observed that the use of digital platforms in recruitment improves candidate quality while reducing the recruitment process's duration. Moreover, Pfeffer (2015) highlighted that e-learning platforms allow HR to deliver more tailored training, thereby optimizing their effectiveness.

Concerning digitalization and listed companies, El Akremi et al. (2018) postulated that these firms might feel increased pressure to adopt digital technologies due to shareholder expectations and regulatory standards. In agreement with Mallin (2018), listed companies, in pursuit of greater transparency, can leverage digital tools to amplify communication and cooperation between staff and management, subsequently influencing HR performance.

Regarding national literature, Abdelkhalek et al. (2021) analyzed the impacts of digitalization on the Moroccan economy and suggested approaches to enhance labor market productivity and flexibility. They recommend intensifying the development of e-governance and prioritizing the adoption of digital technologies in the financial sector to invigorate the economy. The significance of e-commerce and the digitalization of agriculture to address sectoral challenges is also emphasized. However, they underscore the need to prevent a digital divide and ensure that

agricultural digitalization helps combat poverty. Ultimately, digital metamorphosis will be pivotal for Morocco's economic dynamism.

Additionally, Elhazziti et al. (2023) examined Morocco's efforts in digital transformation, highlighting its shortcomings and proposing directions based on new benchmarks. This transformation has focused on digitization policy, training human resources, and expanding digital access. While the public administration is gradually adopting this transformation, cultural and organizational challenges hinder its effectiveness. Despite various initiatives since the 1990s, results have been mixed, as evidenced by Morocco's ranking in e-government indicators. Nonetheless, the COVID-19 crisis has underscored the urgency of this transformation to facilitate access to public services.

3. THE CONCEPTUAL MODEL

The digital revolution is transforming many sectors, and human resources are no exception to this trend. With the rise of technologies, companies are urged to adopt and integrate digital tools to remain competitive. In Morocco, listed companies, like other businesses worldwide, seek to capitalize on the benefits of digitalization to optimize the performance of their human resources. However, this shift to digital comes with significant challenges. The proposed conceptual model below aims to study the impact of digitalization on the performance of human resources in listed companies in Morocco.

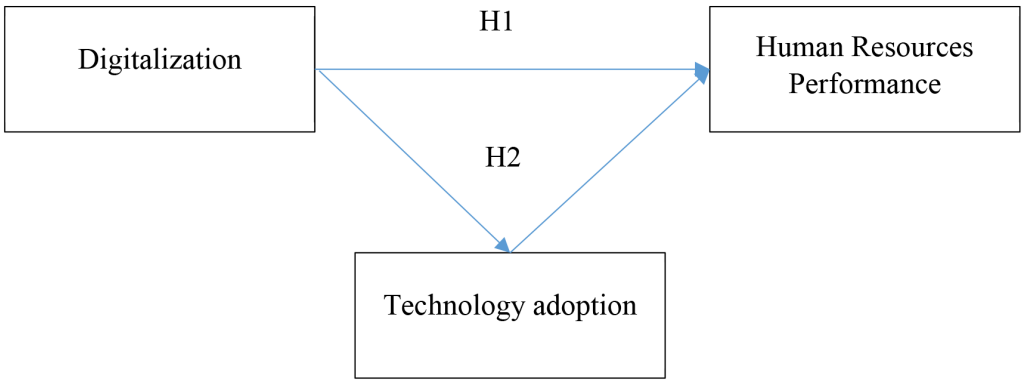

Figure 1. The Conceptual Model
Source: Own research

In this context, digitalization is a multi-dimensional concept that encompasses various aspects such as automation, analytics, mobility, and virtualization (Brynjolfsson & McAfee, 2014). When integrated into the realm of human resources, these elements can potentially transform HR processes, improve efficiency, and contribute to better decision-making (Stone et al., 2015). The conceptual model and the hypotheses presented above analyze the relationship between digitalization and Human Resources performance. The latent variables considered encompass digitalization, covering areas such as technological integration, HR analytics, virtualization, and automation. Additionally, the performance of human resources is addressed from the angles of operational efficiency, employee satisfaction, and recruitment quality.

The mediating variable in this study concerns the adoption of technologies by employees. It is crucial because it could potentially modulate how digitalization influences HR performance. Two main hypotheses are stated: on one hand, it's suggested that digitalization has a direct positive effect on HR performance. On the other hand, it is proposed that the adoption of

technologies by employees acts as a mediator in the relationship between digitalization and HR performance. To quantify these variables, various scales were chosen. The scale related to digitalization relies on the work of Brynjolfsson and McAfee (2014), however, it has been revised to fit an HR context. HR performance is measured using a scale inspired by Stone et al. (2015), incorporating criteria such as operational efficiency, employee satisfaction, and recruitment quality. Finally, the evaluation of technology adoption by employees is based on a scale derived from the work of Davis (1989) and Venkatesh et al. (2003).

Table 1. Variables and Their Measurement Scales

Variables	Measurement Scale	Meaning	Authors
Digitalization	Technological Integration	Degree of adoption and implementation of advanced technologies within HR processes	Shet et al. (2021)
	HR Analytics	Use of data for predictive analysis and decision-making	Mohammed (2019)
	Process Virtualization	Implementation of dematerialized HR processes accessible remotely	Mohamed et al. (2022)
	Task Automation	Degree of technology use to automate routine HR tasks	Stone et al. (2015)
Performance of Human Resources	Operational Efficiency	Measure of how digital tools and processes improve HR operations	Zavyalova et al. (2022)
	Employee Satisfaction	Measures the satisfaction level of employees regarding the digital tools and processes established by the HR department	Jafari and Van Looy (2022)
	Recruitment Quality	Assesses the impact of digitalization on HR's ability to recruit quality candidates	van Esch and Black (2019)
Adoption of Technologies by Employees	Intention to Use	To what extent do employees intend to use the newly introduced technologies?	Anton et al. (2014)
	Frequency of Use	How often do employees use the introduced technologies?	Sundaram et al. (2007)
	Perceived Usefulness	Do employees see the technologies as useful for their work?	Majumder and Mondal (2021)

Source: Own research

4. RESULTS AND DISCUSSION

This section aims to present the results of our analysis focused on the evaluation of human resource performance concerning digitalization. It is essential to ensure the validity and reliability of the measures taken in this analysis, hence the implementation of a systematic approach.

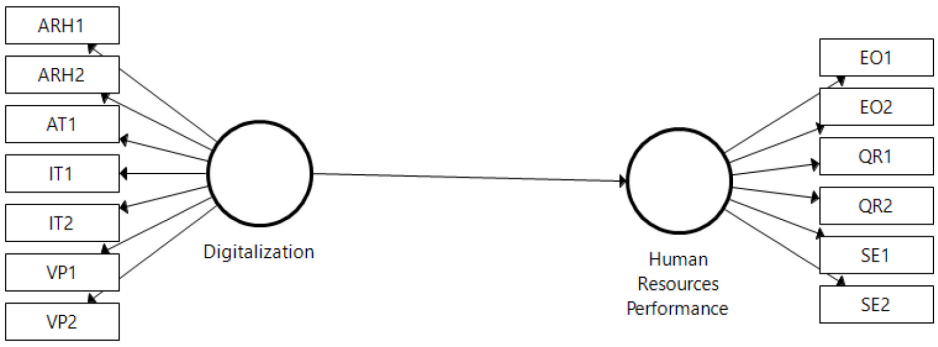

Figure 2. Path diagram model without mediator interaction

Source: Own calculations

Table 2. Reliability and validity indicators

	Cronbach's Alpha	Rho_A	Composite Reliability	Average Variance Extracted (AVE)
Digitalization	0,899	0,902	0,921	0,624
Human Resources Performance	0,893	0,898	0,918	0,652

Source: Own calculations

The analysis of the measurement model is a fundamental component of our study. The primary objective was to confirm the validity and reliability of the observed variables. Several methods were employed to achieve this goal. For instance, we used composite reliability to measure the internal consistency of items within the same construct. Ideally, this reliability should be equal to or greater than 0.7 for confirmatory models. However, during exploratory phases, a value of 0.6 can be deemed acceptable. Indicators, or questions on a scale, underwent meticulous scrutiny to confirm their relevance. An indicator is deemed reliable if it displays significant loading on the construct it is supposed to measure. Another key component of our analysis pertains to the Average Variance Extracted (AVE). It measures the portion of the variance captured by the construct compared to that due to measurement error. An AVE of 0.5 or greater typically signifies satisfactory convergent validity. Regarding the discriminant validity of our measures, we relied on the Fornell-Larker criterion. According to this criterion, the square root of the AVE for each construct should exceed its correlations with all other constructs in the model. Additionally, Table 2 presents the reliability and validity indicators for the "Digitalization" and "Human Resource Performance" constructs. For each construct, four main measures are indicated: Cronbach's Alpha, rho_A, Composite Reliability, and Average Variance Extracted (AVE). For Cronbach's Alpha, Digitalization has a value of 0.899, nearing 1, thus indicating exceptional internal reliability. Similarly, Human Resource Performance displays a value of 0.893, also nearing 1, showcasing its excellent internal reliability. As for rho_A, Digitalization has a value of 0.902, while Human Resource Performance is at 0.898. These values, very close to 1, confirm outstanding internal consistency for the elements of each construct. Regarding Composite Reliability, Digitalization records a value of 0.921, and Human Resource Performance a value of 0.918. Values exceeding 0.9 indicate very high composite reliability for both constructs. It's vital to mention that a value exceeding 0.7 is typically seen as acceptable, making these results particularly impressive in terms of reliability. Finally, regarding Average Variance Extracted (AVE), Digitalization achieves a value of 0.624, and Human Resource Performance a value of 0.652. Given that these figures surpass 0.5, they suggest satisfactory convergent validity for both constructs.

When assessing the performance of human resources concerning digitalization, it is essential to differentiate the various factors and concepts involved. Discriminant validity plays a central role in this process. It is used to verify whether a concept, such as human resource performance, is distinctly separate from other concepts, like digitalization, with which it should not theoretically be associated. This examination helps to understand to what extent a specific element of the model is independent and distinct from others.

To ensure this distinction, the Fornell-Larcker technique is commonly referenced. In the context of evaluating human resource performance in relation to digitalization, this method stipulates that for a concept like human resource performance to demonstrate appropriate discriminant validity, the square root of the AVE associated with this concept must be greater than its correlations with other concepts, such as digitalization. In other words, human resource performance should exhibit a variance more strongly associated with its own indicators than with those of digitalization or other relevant concepts.

Table 3. The Fornell-Larcker criterion

	Digitalization	Human Resources Performance
Digitalization	0,790	
Human Resources Performance	0,757	0,807

Source: Own calculations

Based on the Fornell-Larcker criterion, it appears that the discriminant validity is satisfactory for these two concepts. Each of the concepts, "Digitalization" and "Human Resources Performance", distinctly stands out from the other. The values on the diagonal (square roots of the AVEs) are greater than the off-diagonal correlations, indicating that each concept shares more variance with its indicators than with the other concept. This strengthens the confidence in the model's ability to clearly differentiate between "Digitalization" and "Human Resources Performance."

The table presented below highlights the cross-loadings of various indicators in relation to two key concepts: "Digitalization" and "Human Resources Performance." These cross-loadings illustrate the correlation of each indicator with each of the concepts. Regarding the main loadings versus the cross-loadings, ideally, an indicator should show a pronounced main loading on its own concept while having lesser cross-loadings with other concepts.

By observing the loadings, for indicators like "HR Analytics1", "HR Analytics2", "Task Automation1", "Technological Integration1", "Technological Integration2", "Process Virtualization1", and "Process Virtualization2", the main loadings on "Digitalization" surpass their cross-loadings on "Human Resources Performance." Conversely, for "Operational Efficiency1", "Operational Efficiency2", "Recruitment Quality1", "Employee Satisfaction1", and "Employee Satisfaction2", the main loadings on "Human Resources Performance" exceed those on "Digitalization."

However, some indicators, such as "Recruitment Quality2", show a substantial main loading on "Human Resources Performance" (0.754), but their cross-loading with "Digitalization" is also significant (0.489). This suggests that this indicator is closely related to both concepts, which could raise questions about discriminant validity.

Table 4. Cross-loadings

	Digitalization	Human Resources Performance
HR Analytics1	**0.843**	**0.667**
HR Analytics2	0.705	0.603
Task Automation 1	**0.751**	**0.586**
Operational Efficiency1	0.600	0.779
Operational Efficiency2	**0.623**	**0.833**
Technological Integration1	0.786	0.635
Technological Integration2	**0.858**	**0.611**
Recruitment Quality1	0.628	0.861
Recruitment Quality2	**0.489**	**0.754**
Employee Satisfaction1	0.623	0.778
Employee Satisfaction2	**0.680**	**0.833**
Process Virtualization1	0.797	0.495
Process Virtualization2	**0.780**	**0.554**

Source: Own calculations

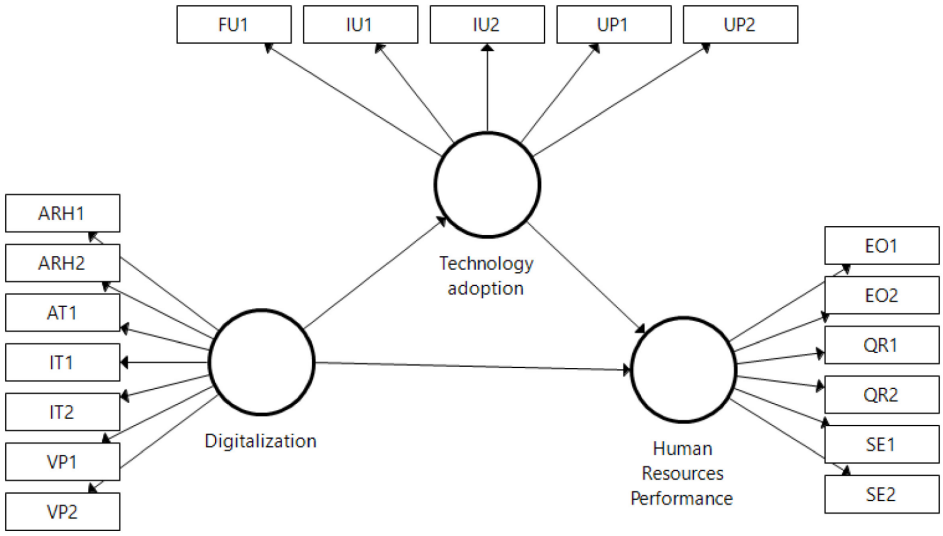

Figure 3. Path diagram model with mediator interaction

Source: Own calculations

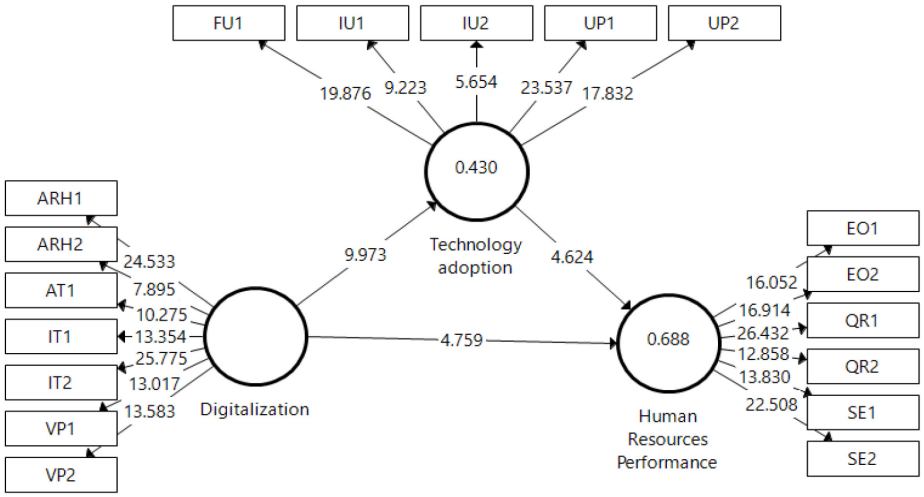

Figure 4. Structural model

Source: Own calculations

For a model to be considered adequate, the R2 value of the endogenous latent variables must be greater than 0.26. Although the table does not explicitly display the R2 values, they can be inferred from the overall context and the path coefficients. The coefficient of determination (R2 value) represents the predictive accuracy of the structural model and is comparable to the square correlation between the real and predicted values of an endogenous construct. An R2 value approaching 1 indicates high predictive accuracy. To understand the relevance of the structural relationships, it's essential to consider the path coefficients and their significance levels, assessed through t-values and the intensity of the relationships. Regarding the relationship between digitalization and employees' technology adoption, the data reveals a strong positive association ($\beta = 0.655$; $t = 9.707$), suggesting that digitalization has a significant impact on employee technology adoption. Moreover, employees' technology adoption is positively correlated with human resource performance ($\beta = 0.459$; $t = 4.571$), suggesting this adoption optimizes HR performance. Furthermore, digitalization has a positive effect on human resource performance, as demonstrated by the β coefficient of 0.452 and the t-value of 4.665. In conclusion, digitalization has a direct effect on HR performance and on employee technology

adoption, which, in turn, influences HR performance. Integrating digitalization and technology adoption is crucial in the HR sector and requires heightened vigilance during the planning and execution of HR strategies.

Table 5. Structural Model Evaluation Results

	Coefficient β	Standard Dev.	T-Statistic	P Values
Employee Technology Adoption → HR Performance	0.459	0.100	4.571	0.000
Digitalization → Employee Technology Adoption	0.655	0.068	9.707	0.000
Digitalization → HR Performance	0.452	0.097	4.665	0.000

Source: Own calculations

According to experts, the R2 value indicates the proportion of variation in the dependent variables explained by predictive variables. Table 6 highlights two factors: Employee Technology Adoption and HR Performance. The β coefficient for "Employee Technology Adoption" is 0.430, with a standard deviation of 0.087. Its t-statistic of 4.937, significant at the threshold of 0.000, demonstrates its marked influence on the variable in question. The "Human Resource Performance" displays a β of 0.688 (standard deviation 0.067) and a t-statistic of 10.250, highlighting a more pronounced influence than technological adoption.

Table 6. Bootstrapping Results for R2

	Coefficient β	Standard Dev.	T-Statistic	P Values
Employee Technology Adoption	0.430	0.087	4.937	0.000
Human Resource Performance	0.688	0.067	10.250	0.000

Source: Own calculations

The f2 measure is commonly used to evaluate the magnitude of the relationships between latent variables in structural equation models. The change in the f2 value when omitting an exogenous construct from the model is used to determine the influence of this construct on the model's endogenous variables. To determine the relevance of the f2 effect, conventional thresholds are adopted: 0.02 indicates a weak effect, 0.15 a moderate effect, and 0.35 a significant effect.

Table 7. Bootstrapping Results for f2

	Coefficient β	Standard Dev.	T-Statistic	P Values
Employee Technology Adoption ► HR Performance	0.385	0.228	1.688	0.092
Digitalization ► Employee Technology Adoption	0.753	0.301	2.498	0.013
Digitalization ► HR Performance	0.374	0.207	1.803	0.072

Source: Own calculations

According to Table 7:

- The impact of "Employee Technology Adoption" on "Human Resource Performance" has an effect size of 0.385. This figure, situated between 0.15 and 0.35, indicates a moderate effect. The t-statistic is 1.688 with a p-value of 0.092, suggesting that this relationship is not statistically significant at the usual threshold of 0.05.
- The influence of "Digitalization" on "Employee Technology Adoption" reveals a very pronounced effect size of 0.753 (greater than 0.35). The t-statistic is 2.498 with a p-value of 0.013, meaning this relationship is statistically significant at the 0.05 threshold.

- The impact of "Digitalization" on "Human Resource Performance" also shows a moderate effect with a size of 0.374. With a t-statistic of 1.803 and a p-value of 0.072, this relationship approaches statistical significance without reaching it at the conventional threshold of 0.05.

Table 8. Cross-Redundancy Results of the Indicators (Q2)

	SSO	SSE	Q^2 (=1-SSE/SSO)
Employee Technology Adoption	350,000	266,605	0,238
Digitalization	490,000	490,000	
Human Resource Performance	420,000	240,961	0,426

Source: Own calculations

Table 8 highlights the cross-redundancy of indicators, commonly referred to as Q2, used to evaluate the predictive validity of a model. A positive Q2 value indicates satisfactory predictive validity, while a negative value reveals the model's inability to predict for the concerned indicator.

For the "Technology Adoption by Employees" indicator, with an SSO (Observed Sum of Squares) of 350,000, an SSE (Estimated Sum of Squares) of 266,605, and a Q2 of 0.238, even though the latter is positive, its value indicates a reasonable predictive validity but not ideal.

For the "Digitalization" indicator, both the SSE and SSO display a value of 490,000, suggesting the model captures no variation for this indicator. Therefore, no Q2 value is specified, indicating the model does not predict this indicator.

Regarding the "Human Resources Performance" indicator, its SSO is 420,000, its SSE is 240,961, and its Q2 is 0.426, reflecting robust predictive validity for this indicator. This shows the model is suitable for predicting human resources performance.

Table 9. Model Adjustment

	Original Sample (O)	Sample Mean (M)	95%	99%
Saturated Model	0,087	0,068	0,083	0,089
Estimated Model	0,087	0,067	0,082	0,089

Source: Own calculations

Table 9 focuses on the model fit using the standardized root mean square residual (SRMR) as the primary criterion. This indicator is essential for assessing the fit quality of a model concerning the observed data. Delving into the results, the saturated model displays an SRMR of 0.087 for the original sample, a sample mean (M) of 0.068, with confidence intervals from 0.083 at 95% to 0.089 at 99%. On the other hand, the estimated model shows similar values: an SRMR of 0.087, a sample mean (M) of 0.067, and confidence intervals from 0.082 at 95% to 0.089 at 99%. When comparing the two models, each displays an SRMR for the original sample below the threshold of 0.10, suggesting an adequate fit. However, since these values slightly exceed 0.08, it's clear that there's room for improvement. Looking at the sample mean, the saturated model's mean stands at 0.068, while the estimated model's is 0.067, indicating a suitable fit. The confidence intervals, both at 95% and 99%, show that the SRMR values remain consistent and uniform between the two models. The saturated model, which encompasses all potential correlations among the constructs, provides a proper fit, though there are opportunities for optimization. Similarly, the estimated model, relying on the overall model structure, illustrates a consistency in its fit in relation to the observed data.

5. CONCLUSION

In conclusion, this article aimed to examine the impact of digitalization on the performance of Human Resources within companies listed on the Casablanca Stock Exchange. In an era where digital transformation is redefining the business world, the role of HR becomes paramount. Our results, based on a rigorous methodology, confirm the positive influence of digitalization on HR performance. It is also proven that the adoption of technologies by employees plays a significant mediating role in this relationship. Thus, digitalization holds a central position in the performance of Human Resources of companies listed on the Casablanca Stock Exchange. The results of the structural model validate the proposed hypotheses. On one hand, digitalization has a direct positive impact on HR performance (β=0.452, p<0.000). On the other hand, the adoption of technologies by employees is a significant mediator in this dynamic. Indeed, digitalization positively promotes the adoption of technologies by employees (β=0.655, p<0.000), which in turn favorably influences HR performance (β=0.459, p<0.000). These conclusions highlight the necessity of digital transformation and technological acceptance to improve HR performances in Morocco. They suggest that to get the most out of digitalization, companies should not only invest in technology but also promote its adoption by employees.

Furthermore, this article confirms the vital role of digitalization in enhancing the Human Resources department. Moroccan companies, especially those listed on the Casablanca Stock Exchange, should perceive this digital transformation not only as an operational imperative but also as a strategic opportunity to boost their efficiency and competitiveness. The active adoption of technologies by employees is also a determining factor in maximizing the benefits of digitalization. These conclusions reaffirm the primary role of Human Resources in the digital age and encourage more companies to take steps in digitalization to boost their performance.

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