



DIGITAL BUSINESS STRATEGY: THE ADOPTION OF ELECTRONIC SIGNATURES IN THE ALGERIAN BANKING INDUSTRY

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ABSTRACT

The increasing use of technological innovations, due to the covid-19 crisis, has led to a notable tendency among businesses to adopt electronic signatures as part of their digital business strategy. This article makes an attempt at measuring the contribution of e-signature to customer satisfaction and quality of the banking service. It delves into Algerian customers' acceptance and willingness to use the e-signature and the evaluation of its outcomes, while aiming at promoting electronic signatures as an instrument which enables digital maturity within Algerian banks. To test the research hypotheses, a quantitative research approach was employed. According to the findings of the survey, Algerian customers tend to accept to use e-signatures if their banks offer it as an option. Moreover, there was positive and statistical significance between the use of e-signature and customer satisfaction and perceived quality of banks.

KEYWORDS: Electronic signatures, digital business strategy, digital maturity, customer satisfaction, service quality.

JEL CLASSIFICATION : M31, G21, O33

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1. INTRODUCTION

In the context of digital transformations, businesses recognizing the shifting preferences of consumers now prioritize the integration of technology to meet their evolving expectations. In this context, electronic signatures have emerged as a crucial technology that enables an organization's digital business strategy and thus, its digital maturity.

While prior research has examined the adoption (Srivastava, 2013) and legal aspects of electronic signatures, there remains a research gap concerning their direct impact on improving customers' satisfaction and their perceived service quality. To address this gap, the central research problem guiding this study is: to what extent are customer satisfaction and perceived quality influenced by the adoption of electronic signature within the Algerian banking industry?

Accordingly, the following hypotheses are formulated:

- H1: The use of electronic signatures influences positively customer satisfaction towards their bank.
- H2: Perceived quality of banking digital services are influenced positively by the use of electronic signature.

The paper aims at measuring the impact of the electronic signature adoption in the banking industry on customer satisfaction towards banks and the service quality provided by the said banks. Furthermore, the adoption of such a service will contribute exponentially to the implementation of banks digital business strategies.

2. LITERATURE REVIEW

2.1 DIGITAL BUSINESS STRATEGY

Information technology becomes an integral component transforming the dynamics of organizations' competition (Uhlig and Remané, 2022; Woodard et al., 2013). It offers multiple strategic opportunities that fundamentally redefine the ways companies compete, drive innovation, and deliver new products and services, all while creating unique value within their businesses (Mies et al., 2023). Yet, these opportunities necessitate a restructure of how managers' address their strategy formulation and implementation since the alignment of business strategy with IT strategy remains insufficient. Instead, IT strategy must be deeply integrated and fused within the firm's overall business strategy (Bharadwaj, et al. 2013).

The construct of digital business strategy simply refers to the incorporation of IT strategy into firm's overall business strategy. To be said differently, the business strategy is said to be digital when an "organizational strategy formulated and executed by leveraging digital resources to create differential value" (Bharadwaj, et al. 2013). A strategy of this characteristics is more than a conventional IT strategy since it represents the organization's involvement level in various IT activities (Mithas, et al., 2013). Accordingly, digital business strategy centers around an organization's deliberate efforts to compete through supplying digitally enabled products or services (Woodard, et al., 2013). Thus, we can say that, from a business perspective, digital business strategy is not a distinct strategy, but a unique digital-oriented perspective on business strategy, which represent an appropriate answer to the question: how should an organization evolve to thrive in an increasingly digital-driven business environment?

The previous definitions of digital business strategy highlight the following key aspects:

- The adoption and strategic integration of digital technologies: In essence, digital business strategy revolves around the exploitation of myriad digital technologies and innovations to attain business objectives. This makes that the role of IT strategy and digital resources go beyond a mere supporting role; rather, they will be included in all primary and support activities of the firm.

- Firm-level strategy : the consideration of digital business strategy as a functional one is utterly wrong, rather, its level amounts to a higher level. It can be considered as digital lens of business strategy focusing on achieving broader organizational goals through digital capabilities, which makes it more organization-level strategy.
- Delivering high value: It reflects the strategic role of IT and digital resources as key drivers of competitive advantage and strategic differentiation.

2.2 TECHNOLOGY: THE ESSENCE OF DIGITAL BUSINESS STRATEGY

Digital business strategy originates from the ramifications of implementing digital technologies that led to a drastic change and restructure of traditional business strategy (Bharadwaj, et al., 2013). It centers on the ways digital technologies make an organization more competitive and how organizations should redefine their value creation processes in response to digitalization (Kane, et al., 2017). As such, digital technologies play a central role in reshaping how an organization provides its products and services, exceeding by that their usual supportive and complementary function (Pagani, 2013).

In the context of digital business strategy, the diverse opportunities offered by technological innovations and solutions induce valuable options to enhance customer experience. For example, as part of its digital strategy, the Singaporean bank DBS has optimized its use of data analytics technology and exploited customers data from its digital platforms such as social media, to create new and innovative customer experience (Sia, et al.,2016). This process (data analysis) conducted by DBS bank reveals that wealthy Asian clientele tend to be digitally savvy and prefer digital interaction over physical contact. As result, DBS bank has introduced a novel digital platform for wealth management, enhancing by that their customer's experience and satisfaction, and creating a new added value.

In the present article, our focus will be the adoption of electronic signature (e-signature) technology as part of a digital business strategy as a mean to amplify customer satisfaction and perceived quality in the Algerian banking industry. Consequently, in the next sections we will provide an overview about e-signature technology and the factors influencing its adoption.

2.3 OVERVIEW OF ELECTRONIC SIGNATURE

Same as digital transformation, the electronic signature notion is not a recent concept. Its initial framework was presented in 1976 by Hellman and Diffie. An electronic signature comprises a set of electronic data, such as letters, numbers, symbols, or similar elements, associated with an electronic transaction or document. It serves the purpose of identifying the signatory and distinguishing them from others, while also indicating their agreement with the content of the electronic document (Ghanem, 2021).

Following its initial emergence, a multitude of categories of electronic signatures have emerged. The distinction regarding the various types of electronic signature is primarily based on two essential criteria:

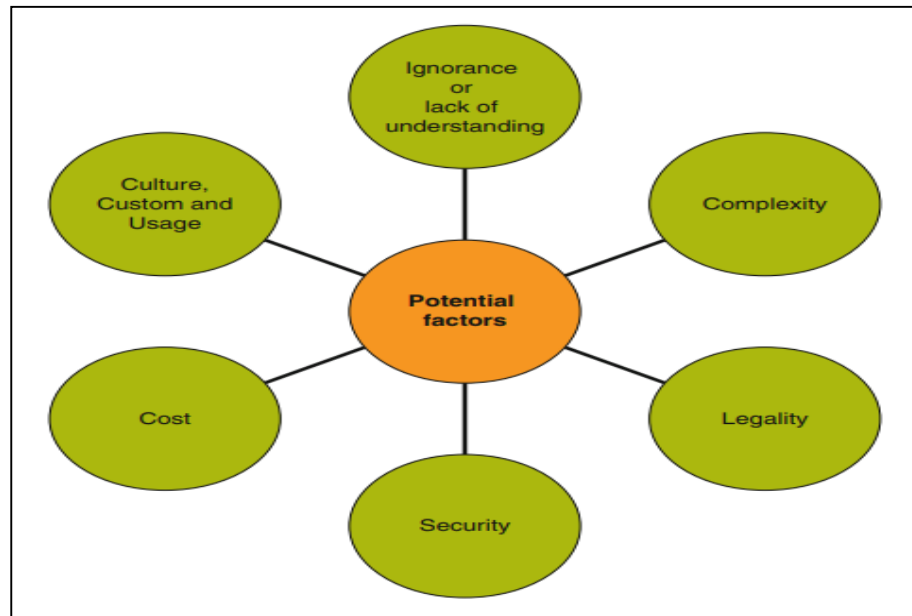
- The legal value attached to the signature: Electronic signatures can be classified based on their level of legal recognition. According to The European eIDAS regulation (electronic IDentification, Authentication and trust Services) there are 03 types of electronic signatures, classified in descending order, namely, qualified, advanced, and simple, based on their legal value, level of security, and identification.
- The technical characteristics for creating the signature: This refers to the specific technological requirements and methods used to generate and authenticate the signature. This comprises considerations such as cryptographic algorithms, key generation and management and other mechanisms. In this case, we distinguish: Digital signature, Biometric signature, Signing with the Electronic Number, or with magnetic card (Ghanem, 2021).

To sum up, electronic signature is now an essential component in digitalization processes, playing a crucial role in the security and reliability of online transactions. It helps establish a favorable atmosphere of trust for both customers and businesses, making it crucial in every digital transformation journey.

2.4 FACTORS INFLUENCING ELECTRONIC SIGNATURE

Businesses are resistant regarding the adoption of electronic signatures, which has resulted in a notably lower acceptance and adoption rate than the previous estimations of this solution's vendors (Srivastava, 2013). This reluctance stems from the rejection of electronic signature as a modern alternative to handwritten signatures. The potential determinants influencing the adoption of electronic signature are illustrated in figure 01 below:

Figure 1: Factors influencing e-signature adoption



Source: Srivastava, 2013

As indicated in the figure above, multiple factors can influence the decision-making process with regard to the adoption of electronic signatures. These factors can be internal related to the technology itself, or external related to the external environment (Srivastava, 2013):

- **Incomprehension of the electronic signature:** To be aware of electronic signature cannot always be translated into exact comprehension of the multifaceted character of this solution. This ignorance can lead to misunderstanding among individuals who frequently confuse it with digital signature, which represent only one particular form of e-signatures.
- **Culture, custom and usage:** The traditional relationship of signing a document with a handwritten signature, which involve the physical act of using a pen and observing one's own hand-drawn trace on the paper, causes a feeling of unease and discomfort among users when they shift to the adoption of electronic signature.
- **Complexity:** The technical complexity associated with the utilization of electronic signature can be a barrier to their adoption. Furthermore, the complicated procedures involved in obtaining electronic signature certification, as well as the necessity of compatibility between various mediums and the type of electronic signature employed (the two sides of the agreement), hamper the adoption of electronic signature.
- **Cost:** The borne cost to implement electronic signature is one of the barriers to its adoption, particularly for small organizations with limited funds.
- **Security:** Concerns related to the electronic signature's security are another significant barrier to its acceptance and adoption. Building a trustworthy relationship between the involved parties becomes challenging due to doubts and queries concerning the ability of this technology to maintain confidentiality and protect data. Moreover, fears arise regarding the security of storage spaces dedicated to personal information forming the electronic signature.

- **Legality:** Legislation and regulations play a crucial role in monitoring the utilization of electronic signatures. Regulations also oversee the selection process of the appropriate type of e-signature that aligns with the specific activities and businesses requirements.

2.5 ELECTRONIC SIGNATURE AND CONSUMER BENEFITS

With its innovative nature, electronic signature improves a customer's purchasing experience and satisfaction and provides them various advantages including (Peric, et al., 2021):

- **A simplified and convenient purchase process:** the adoption and implementation of electronic signature contribute to the simplification of the purchasing process as it enables consumers to promptly sign and authorize contracts using their electronic devices like Smartphone, computer, or tablets, without the need for in-person presence. This approach considerably enhances the customer satisfaction with the provided services.
- **Anytime, anywhere operations:** through the utilization of electronic signature as an authentication mechanism, consumers gain the flexibility and the freedom to engage in transactions at their convenience and from any location, as long as they possess internet connectivity.
- **Rapid service delivery:** the utilization of electronic signature ensures the prompt completion of contracts and documents, which lead consumers to perceive a high level of service quality.
- **Enhanced transaction security:** The encryption system used in the digital signature allows consumers to ensure a very high level of security in their operations and transactions. Therefore, the modification of the signature and the content of the document becomes impossible which makes the possibility of fraud unlikely (Pooja and Yadav, 2018).
- **Modern purchase process:** Whether remotely or in the physical store, the electronic signature allows the consumer to benefit from a digital and modern purchasing experience that particularly meets their needs and expectations.

3. RESEARCH DESIGN

In order to set a conducive environment for the implementation of electronic signature in Algeria as a modern tool for enabling organizations' digital maturity and assessing their potential acceptance and willingness to use this solution, the study investigates the role of electronic signatures in improving customers' satisfaction and perceived service quality regarding the online banking experience and services.

As stated above, the following hypotheses will be tested:

- **H1:** The use of electronic signatures influences positively customer satisfaction towards their bank.
- **H2:** Perceived quality of banking digital services are influenced positively by the use of electronic signature.

Due to the nature of the research problem, a quantitative approach was judged to be appropriate. An online survey was carried out as the primary data collection mode which was particularly designed to address the research objectives. As the availability of a comprehensive sampling frame for random probability techniques was not an option, a non-probability sampling method was employed. 63 filled copies of the posted questionnaire were collected. However, only 51 copies were accepted to test the research hypotheses. The variables used in this study and their scale measurement are illustrated below:

- **The use of electronic signature:** Seven-point Likert scales to measure this variable by evaluating the benefits resulting from the use and adoption of this solution including: security of online banking transactions, ease of purchase process, speed, and modernity of digital banking experience.
- **Customer satisfaction:** Seven-point Likert scales was employed to assess customer satisfaction regarding the online banking services.

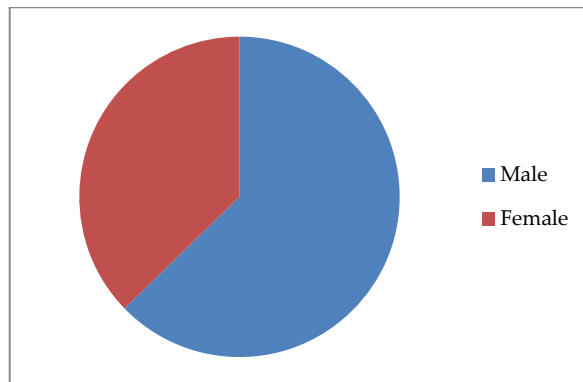
- **Perceived service quality:** To measure perceived quality, seven-point Likert scales were adopted which evaluate respondents' perceived service quality of banks that provide its clients electronic signature option.

4. FINDINGS AND DISCUSSION

4.1 DESCRIPTIVE ANALYSIS

The survey contains questions to help identify the targeted population.

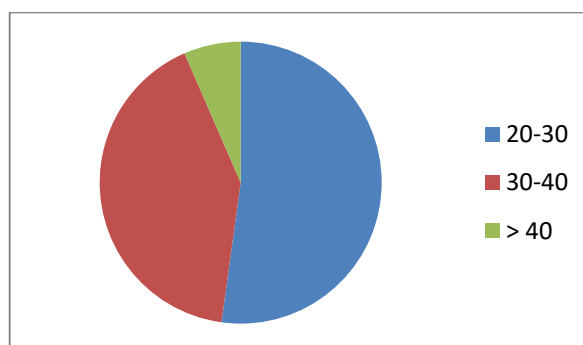
Figure 2: Respondent's gender



Source: personal effort

The sample size of this study is 51 respondents, were 62,7% are males and 37,3% are females. This result shows that the trend of using electronic signatures arouses the curiosity and attention of both genders: male and female. This distribution was not done deliberately, because our questionnaire was distributed online without discrimination between the two genders.

Figure 3: Respondent's age



Source: personal effort

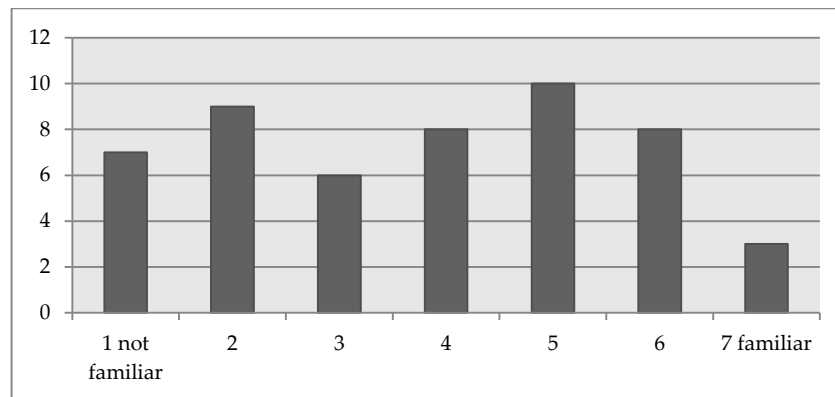
Regarding age, 52,17% of respondents are aged between 20 and 30, 41,33% are aged between 30 and 40, and only 6.52% are over 40 years old.

According to this analysis of the age of the respondents, we note that almost all age groups are interested in the trend of using electronic signatures, in particular young people who are, on one hand, more connected and therefore had more access to the questionnaire and on the other hand, more interested to technological

developments and the use of digital innovations. However, this does not diminish the attractiveness of the theme for other age groups.

4.2 FAMILIARITY WITH E-SIGNATURES

Figure 4: Respondent's familiarity with e-signatures

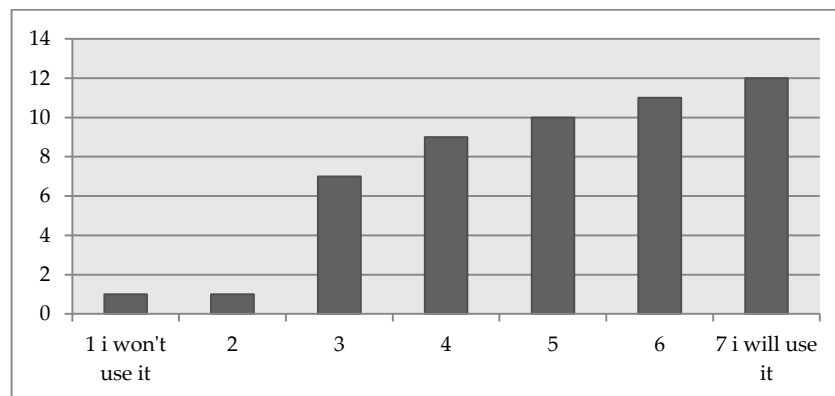


Source: Personal effort

The results indicate that over 56,9 % of the respondents have a certain level of knowledge about electronic signatures and are familiar with this technology. While, 43,1 % of them indicate their limited knowledge about electronic signatures.

4.3 WILLINGNESS TO USE E-SIGNATURES

Figure 5: Respondent's Willingness to use electronic signatures



Source: Personal effort

The results demonstrate that the majority of the respondents (82,35 %) are willing to use the electronic signature as method for authentication if their banks offer it as an option. While, only 1,76 % of them still hesitate to use this technology.

This can be explained by these consumers' adaptation to the digitalization trends, particularly after the epidemic crisis, which encouraged the use of digital tools and stimulated potential users' interest in learning more about the advantages and benefits of these technological innovations.

5. HYPOTHESES TESTS

5.1 Testing Hypothesis 1

Table 1 : ANOVA					
Model	Sum of squares	df	Mean square	F	Sig.
1					
Regression	27,974	1	27,974	45,149	,000 ^b
Residual	30,360	49	,620		
Total	58,333	50			

Source: Personal Efforts

According to the ANOVA table, the p-value is 0, which is lower than the significance level $\alpha=0.05$. This leads to reject the null hypothesis stipulating $r^2 = 0$. Thus, the model is significant, i.e. variation in customer satisfaction regarding banks can be explained by variation in electronic signature.

Table 2 : Model summary				
Model	R	R Square	Adjusted R Square	Std. Error of the estimate
1	,692	,480	,469	,78714

Source: Personal Efforts

The adjusted R square of this model is moderate (48%). That is, the benefits derived from the utilization of e-signature explain 48% of variation of the dependent variable, customer satisfaction regarding the bank's services.

The contribution of E-signature utilization to the variation of the customer satisfaction regarding the bank services was found statically significant ($p<0.0001$). It influences positively satisfaction ($\beta = 0.692$). The parameter is statistically significant for the calculated t-value which is 6,719, highly superior to the critical value.

Table 3 : Coefficients					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1					
(Constant)	,451	,637		,709	,482
E-signature utilization	,766	,114	,692	6,719	,000

Source: Personal Efforts

$$\text{Customer satisfaction} = 0,451 + 0,766 \text{ E-signature utilization}$$

According to the previously presented findings, the utilization of e-signature significantly and positively contributes to the variation of the customer satisfaction regarding the bank services. Consequently, the first hypothesis stipulating "The use of electronic signatures influences positively customer satisfaction towards their bank" is accepted.

5.2 Testing Hypothesis 2

The table below indicates that the overall model is significant. The value of F is significant ($p=0.008$). There, there is a relationship between electronic signature and perceived quality of banks digital services.

Table 4 : ANOVA 2

	Model	Sum of squares	df	Mean square	F	Sig.
2	Regression	10,395	1	10,395	7,574	,008
	Residual	67,252	49	1,372		
	Total	77,647	50			

Source: Personal Efforts

As the table below illustrates, the R square is relatively low (0,134). Accordingly, the independent variable of e-signature utilization explains 13.4% of the variation of the dependent variable of perceived service quality.

Table 5 : Model Summary 2

Model	R	R Square	Adjusted R Square	Std. Error of the estimate
2	,366	,134	,116	1,172

Source: Personal Efforts

$$\text{Perceived service quality} = 2,078 + 0,467 \text{ E-signature utilization}$$

The results show that e-signature utilization influence significantly and positively ($\beta = 0,366$) the dependent variable "perceived service quality".

Table 6 : Coefficients 2

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
2	(Constant)	2,078		2,191	,033
	E-signature utilization	,467	,366	2,752	,008

Source: Personal Efforts

Based on the abovementioned results, electronic signature adoption significantly and positively influences banks perceived service quality. Hence, the second hypothesis which hypothesizes that "Perceived quality of banking digital services are influenced positively by the use of electronic signature" is accepted.

To summarize, the use of e-signatures increases consumer satisfaction and perceived service quality regarding online banking services. This solution provides a variety of benefits, including increased security, faster and simpler service delivery, and a more modern banking experience. These findings demonstrate that Algerian customers are increasingly emphasizing the digitalization aspects of services and incorporating them into their evaluations of service quality and satisfaction. Nevertheless, in order to increase the strength the link between e-signatures adoption and the improvement of consumer satisfaction and perceived service quality, in addition to address potential consumers' ignorance and resistance, efforts should be made to promote awareness and create trust in the technology.

6 CONCLUSION

The present study makes an attempt at exploring the crucial role of adopting electronic signatures as a part of digital business strategy, on improving customers' satisfaction and perceived service quality. By conducting

a thorough exploration of relevant literature and giving empirical evidence to the topic of interest, the results of this study concludes that the strategic integration and implementation of electronic signatures enhances customers' satisfaction and perceived service quality, particularly from a customers' perspective within the Algerian banking industry context.

The research findings demonstrate that electronic signature adoption, measured by a variety of benefits (the speed and easiness of the purchasing process, the modernization of the customer experience, and security of online banking transactions) positively influences both customer satisfaction regarding banks services and their perceived service quality.

Before any efforts of implementing electronic signature, conducting a market research is required to assess potential customers' perceptions and attitudes regarding this technological instrument. Moreover, addressing unfavorable attitudes through targeted communication initiatives can lead to significant improvement of understanding among potential users about the importance and benefits of electronic signatures.

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