The impact of transformational leadership style on the intention to use AI technology in Lebanese banks: The role of perceived usefulness and ease of use

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Abstract: This research investigates the impact of transformational leadership style on the intention to use Artificial Intelligence (AI) in Lebanese banks, and tests the roles of perceived usefulness and perceived ease of use. The study aims to address the gap in understanding what influences the intention to adopt AI. A quantitative, deductive research methodology was employed, utilizing a questionnaire distributed to Lebanese banking leaders. A total of 250 valid responses were collected online. Reliability and validity of the model were assessed using SPSS, while Structural Equation Modeling with AMOS was applied to evaluate the hypothesized relationships. The findings reveal that transformational leadership has a significant positive effect on perceived ease of use, but no significant impact on perceived usefulness. Additionally, perceived usefulness and perceived ease of use both exhibit a positive and significant influence on the intention to use AI. Furthermore, perceived ease of use positively affects perceived usefulness. This implies that banks can invest in hiring transformational leaders to enhance employees' perceptions of ease of use, ultimately driving greater acceptance of AI technologies.

Keywords: *Artificial intelligence, Intention to use, Perceived ease of use, Perceived usefulness, Transformational leadership.*

1. Introduction

Artificial intelligence (AI) has become an emerging exponential power in the banking industry, reshaping many aspects of operations, customer-facing facets, and communications [1]. In today's banking environment, digital innovations are no longer optional for financial institutions; rather, they become essential to help them deal with a more competitive market and shifting client expectations [2]. AI has been the primary force behind the development of numerous new digital technologies in the current banking age, which has resulted in creative disruptions of banking channels, services, and solutions [3]. Since AI is becoming increasingly prevalent in the banking sector, financial institutions must assess how internal stakeholders view the benefits of adopting AI, the importance of leadership, and various other factors that influence organizational AI adoption [4].

The FinTech industry is becoming more competitive as a result of the rise of competition in the financial sector [5]. In order to meet customer requests and protect the privacy of their customers' information, banks are expected to employ creative solutions and suitable security measures [6]. However, compared to new FinTech companies, incumbent banks are inevitably at a disadvantage when it comes to using new technology [7]. Banks may find it challenging to adjust because of current procedures that prevent the deployment of new technologies [8]. Additional security risks could arise from the incompatibility of new solutions with outdated financial and security software systems. While backend systems are the focus of many AI-powered solutions used by banks, some AI features are made clear to end users. This suggests, in terms of cybersecurity, that banks' security protocols should

consider their customers' technological familiarity. This is related to the Technology Acceptance Model (TAM) [9], which explains why users could adopt new technologies. According to the model, ease of use and usefulness are the two main variables that influence people's acceptance of technology.

Avidov-Ungar [10] emphasizes that while technology is evident and widely acknowledged, leadership approaches that have worked in the past must still be used [10]. Effective leadership practices play a crucial role in facilitating digitalization, which is the prevalent integration of digital technologies into diverse elements of organizational functioning. People who exemplify digital leadership understand the deliberate consequences of technology and help their companies realize its full potential. The vision, flexibility, and proactive tactics demonstrated by individuals in leadership positions are critical to the success of digitalization [11].

According to Bass and Riggio, leadership is the skill of persuading and directing people toward a shared goal [12]. It involves using power to encourage, inspire, and guide people individually or as a group toward common objectives [13]. The fundamental aspect of leadership is one's influence on others, encouraging teamwork and skillfully overcoming obstacles in the service of a higher goal [14].

The banking sector in Lebanon is lightly utilizing AI technology for several reasons, including the reluctance of local Lebanese banks to integrate it into their financial operations; two possible reasons for this are the high costs of addressing customers' concerns about AI and the absence of top management support [15]. However, the Lebanese banking sector has proven that using AI technology to create new value propositions and provide exceptional customer service will increase consumer-based brand equity. Lebanon has faced one of the worst compounded crises in history, with drastic impacts on the economy, including the banking sector [16].

Few studies focus on the topic of leadership style and technology adoption, and few academic researchers have actually investigated the relationship between technological acceptance and leadership style. For instance, Al Ahmad [17] examined the relationship between transformational leadership and innovation in Lebanese banks Al Ahmad [17]. Baba [18] showed the role of creative and innovative leadership in adopting FinTech Baba [18]. Almeida [19] demonstrated the relationship between leadership style and employees' adoption of information systems [19]. Another study by ElKhani [20] investigated the efficiency of the Enterprise Resource Planning system, presenting another area of study on the relationship between technological acceptance and transformational leadership (TL) style [20]. The study proved that TL positively affects perceived usefulness and perceived ease of use. The study used the TAM model to allow other researchers to add external variables [20], measuring behavioral intention to use technology, and consisting of certain constant predictors extended by external variables [21]. TAM postulates a path of technology acceptance, from external variables to beliefs, attitudes, and system usage [22]. Although TAM is a supportive model, it needs to be implemented into a larger one that considers factors affecting social and human change processes, as well as the adoption of the innovation model [23].

Building upon TAM by adding external factors like leadership style to assess their impact on the intention to use AI and digitalization, and testing the role of perceived usefulness and ease of use of AI, adds value [24]. In Lebanon, there is a lack of AI adoption, and there is a scarcity of studies that address this issue and discover the reasons behind it. The gap exists in the ignorance of what influences the intention to use AI and the decision to adopt AI. This research is conducted to bridge this gap by discovering the effect of leadership styles and the role of perceived usefulness and ease of use on the intention to use AI. Bridging this gap will be an invaluable asset for existing and future banks for the best positioning towards technology [25].

1.1. Technology Acceptance Model (TAM)
1.1.1. Technology Acceptance Model (TAM)
The Technology Acceptance Model (TAM) in Figure 1, initially proposed by Davis [26], has been used in a wide range of fields to assess how well users accept information technology. It has been used to investigate the adoption of technologies.

According to the TAM, perceived usefulness and perceived ease of use are the predictors of a user's intention to use IT [26-28]. Research conducted by Dajani and Yaseen [27] showed that TAM's characteristics, especially generalizability and application, make it the most powerful model applied to a broad range of technological contexts [27].

De Sena [29], de Luna [30], Kim [31], Liébana-Cabanillas [32], Cao [33], Shankar and Datta [34], and Singh [35] have examined in their research the factors that influence users' intentions toward the adoption of mobile payments.
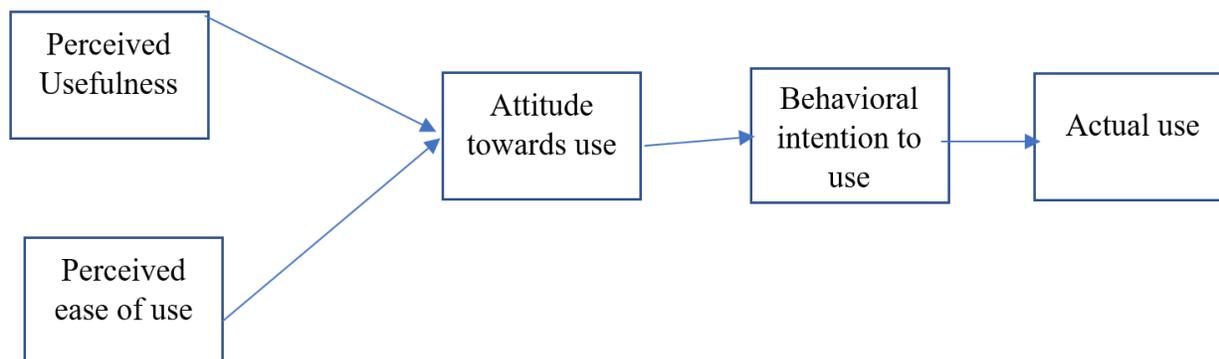

Figure 1.
The original Technology Acceptance Model.
Source: Davis [26].

TAM2 was developed by Venkatesh and Davis [36], adding two additional variables: social influence that includes subjective norms, and cognitive instrumental processes that incorporate factors such as job relevance, output quality, and perceived ease of use.

1.2. Perceived Usefulness

Davis defines perceived usefulness (PU) as the extent to which a user believes that certain technology will benefit daily tasks [26]. PU is the degree to which an individual believes that their performance will result from the use of a specific system. Research consistently shows that PU is a critical factor in determining users' intentions to use technology. PU is frequently cited as a powerful predictor of an individual's behavioral intention to adopt new technology [37]. Specifically, it reflects someone's feeling that using a system will improve their job performance. In general, users are more willing to consider digitized services that offer them added value [32].

The TAM has been implemented in the healthcare industry to explore important elements that impact doctors' readiness to embrace new technology, such as perceived utility and simplicity of use. The goal of the study was to develop focused tactics that could accelerate the adoption of these innovative medical technologies by gaining a detailed understanding of physicians' attitudes and opinions toward AI [38].

Behavioral intention, willingness, and use behavior of AI across many businesses are strongly and favorably related to perceived usefulness [39]. In terms of assistant-enabled smart speakers under the umbrella of AI, perceived usefulness influences attitude, continuance usability, and online purchasing [40]. PU also positively impacts consumers' intention to use e-wallets; PU partially mediates the relationship between perceived ease of use (PEOU) and intention to use (ITU). These findings result from a study conducted in India, where data were collected from e-wallet users using convenience sampling [41].

1.3. Perceived Ease of Use

Perceived ease of use (PEOU) refers to the extent to which an individual believes that using a particular system requires minimal effort. According to Davis, PEOU is the user's assessment of how simple it is to operate technology [26]. PEOU was found as a significant predictor of PU, rather than a parallel, direct determinant of acceptance, and thus it can affect acceptance indirectly through PU [42].

According to the perceptions of Bank DKI's micro-customers in Surabaya, the goal of the study was to determine the elements that influence the use of mobile banking. The findings showed that perceived ease of use has an impact on mobile banking usage both directly and indirectly through attitudes toward use [43]. PEOU was also used to assess customers' usage of online services in Indonesia, but the result showed an insignificant relationship [44]. Another study conducted in Indonesia tested customers' intention to use e-wallets and showed that PEOU positively impacted continuance intention both directly and indirectly, using customer satisfaction as an intervening variable [45]. In Jakarta, a study focused on the intention to use e-banking demonstrated that the intention to use e-banking services was significantly influenced by perceived ease of use [43].

1.4. Intention to Use

Intention to use refers to an individual's predisposition to continue utilizing a particular technology. An indicator of the factors influencing a desired behavior (such as using technology) is intention [46]. It also shows how much effort a person would put into carrying out a behavior. It reflects their conduct and level of expertise, which can indicate how deeply they engage with the technology. For example, individuals who are motivated to use technology may enhance their devices with supportive accessories or encourage others to adopt the same technology [26].

Usage behavior describes how certain customers use a product or service to their advantage and can also mean that they adopt it. TAM concurs with the notion that beliefs like PU and PEOU ultimately determine how people use technology [47]. Researchers have discovered evidence to indicate a strong correlation between e-banking adoption intentions and actual usage [48].

Behavioral intention to use (BIU) is defined as a measure of the prospect that a person will employ the application [46, 49]. The degree to which an individual intends to adopt services is measured by their behavioral intention to use e-banking services [49]. An indication of a person's readiness to perform the given behavior is reflected by the intention [50]. In the information technology literature, behavioral intention is consistently examined as a predictor of an individual's behavior [51].

Davis [26] adopted the rationale of causality to explain how people behave when they accept information technology while developing TAM [26]. This theoretical framework offers a fundamental consideration of how external factors influence users' beliefs and intentions to use the technology. Users' own beliefs about perceived usefulness and ease of use influence their acceptance behavior for the product development process. These two ideas also have an impact on users' attitudes and intentions toward the product creation methodology, which in turn has an impact on how consumers employ such technological behavior.

1.5. Transformational Leadership Style

According to Baker, transformational leaders are able to build trusting relationships with their followers and utilize these relationships to motivate them to do more than they previously thought possible [52]. A mutually agreeable and inspiring future vision can be communicated by a transformational leader, who can also inspire loyalty and devotion to the organization's objectives [13, 52].

The notion of transformational leadership gained prominence in the 1990s [53]. Bass and Riggio describe transformational leaders as embodying four key characteristics: inspirational motivation, intellectual stimulation, idealized influence, and individualized consideration [12]. Leadership scholars have identified mediators and moderators that elucidate how the sub-dimensions of transformational leadership affect organizational outcomes [54-56].

Transformational leaders translate decisions into actions by leading through example and aligning their behaviors with organizational values. As role models, they inspire their followers by presenting a compelling and motivating vision of the organization's mission. Unlike directive, authoritarian leaders who rely on strict instructions and contingent rewards, transformational leaders lead with empathy, offering autonomy and encouraging creative problem-solving [57]. By empowering followers, they foster a supportive environment where individuals are motivated to take on challenging objectives and achieve personal and organizational growth.

Transformational leadership is a leadership style that focuses on elevating goals, providing inspiration and motivation, envisioning the future, recognizing environmental changes, and implementing extraordinary changes within an organization [58]. TL fosters a high level of trust among team members, contributing positively to organizational performance and growth. Transformational leaders stimulate and inspire their followers to achieve remarkable outcomes while simultaneously developing their own leadership capacities. By addressing the individual needs of followers and aligning their objectives with those of the leader, the group, and the broader organization, transformational leaders empower individuals and facilitate their growth into leaders. This leadership style can propel followers to exceed expected performance levels [13, 59].

In the rapidly evolving technological industry, where innovation and agility can determine an organization's success or failure, transformational leadership is essential [60-62].

Many researchers study transformational leadership as one of the leadership styles affecting responses to change and technology adoption [63, 64]. In his study on top management at technical and vocational institutions in Brunei, Seyal concluded that transformational leadership is important at the stage of technology development and adoption Seyal [65]. Imran [66] and Khan [67] concluded that all transformational leadership qualities are important when it comes to organizational innovation and technology adoption Imran [66] and Khan [67]. Humphreys [68] found that transformational leadership was significantly related to support for emerging technology [68]. Nusair [69] concluded that transformational leadership is an important determinant and predictor of innovation in the context of the Jordanian public sector [69].

1.6. Dimensions of TL

(1) Idealized Influence: According to Covin [70], idealized influence is the capacity to establish a strong symbolic authority that workers like to associate with. (2) Individual Consideration: It is the extent to which a leader attends to the needs of their team members, serves as a mentor, and addresses their issues and requirements [71]. (3) Intellectual Stimulation: It is the extent to which a leader challenges assumptions, takes chances, and shares ideas with staff members [72]. (4) Inspirational Motivation: Building an initiative for excellence and accepting change with confidence are the goals of inspirational leadership [73].

1.7. Conceptual Framework and Hypotheses

The current research tests the relationship between transformational leadership style, considered to be the widely used and commonly studied leadership style [74], and TAM attributes.

1.7.1. The Relationship between Transformational Leadership and Perceived Usefulness

Organizational innovation is directly and indirectly influenced by transformational leadership [75]. The impact is due to the enhancement of self-confidence, furthering morale, and nurturing motivation. Additionally, transformational leadership emphasizes the achievement of common goals for the group's interest [76].

ElKhani [20] showed in their study about the efficiency of Enterprise Resource Planning (ERP) systems that TL positively impacts perceived usefulness through the assimilation of self-efficacy, either directly or indirectly [20].

Similarly, a study applying the Technology Acceptance Model and transformational leadership to examine factors influencing technology use by international students at the University of Miskolc, Hungary, revealed that transformational leadership positively impacts both TAM and the intention to use technology [77].

Transformational leadership is positively related to behavioral intention to use mobile commerce. A regression analysis found that perceived usefulness and perceived ease of use are positively related to the behavioral intention to use m-Commerce in commercial banks in the USA [78].

Schepers [79] showed in their findings that, in a high-tech services company in the Netherlands, only the relationship between transformational leadership and perceived usefulness was significant [79].

Moreover, perceived usefulness (PU) of AI is positively influenced by transformational leadership, highlighting its role as a strong predictor of successful AI integration [11]. A study by Trang found that transformational leadership significantly influences perceived usefulness (PU) in Vietnam regarding the use of digital technology [80]. Another study shows that transformational leadership positively affects perceived usefulness of using technology in the manufacturing domain, where managers influence employees' acceptance of Industry 4.0 technology adoption [81].

H₁: Transformational leadership positively influences the perceived usefulness of AI.

1.8. The Relationship between TL and Perceived Ease of Use

Schepers [79] showed in their findings that, in service firms, the relationship between transformational leadership and perceived ease of use was not significant [79]. However, most previous studies showed positive relationships between TL and PEOU and PU.

The perceived ease of use (PEOU) of AI is positively influenced by transformational leadership, highlighting its role as a strong predictor of successful AI integration [11]. This suggests that transformational leaders in higher education, such as academic librarians, can enhance an environment conducive to AI adoption by promoting its application and usefulness.

Furthermore, a study by Trang found that transformational leadership significantly influences perceived ease of use (PEOU). This indicates that effective transformational leadership can positively impact employees' opinions regarding the ease of use of digital technology [80]. This research highlights the critical role of transformational leadership in helping staff embrace digital technology, suggesting that leaders in Vietnamese banks should adopt this leadership style at this crucial time [80].

H₂: Transformational leadership positively influences the perceived ease of use of AI.

1.9. The Relationship between Perceived Usefulness (PU) and Intention to Use AI

The variables considered pillars of the TAM model are perceived usefulness (PU), perceived ease of use (PEOU), and intention to use. According to this pattern, a person's intention to use new technology is influenced by their perception of its utility and usability [82]. Numerous studies in various fields and organizations have examined perceived usefulness, perceived ease of use, and intention to use [83, 84].

TAM postulates that PU, PEOU, and the intention to use technology are interrelated [82]. Additionally, TAM proposes a reciprocal link between PEOU and PU, according to which a technology is considered more valuable the easier it is seen to be to use [36].

According to research in the mobile payments industry, PU and users' intention to use this technology are positively correlated [30, 32, 35, 85]. For instance, a study by Kitsios [28] on Greek banking employees confirmed that PU and PEOU positively influenced the intention to use digital banking [28].

Additional studies corroborate the importance of PU in technology adoption. Mital [86] found that individuals are more likely to embrace and use technology if they believe it will improve their performance [86]. Similarly, Gao and Bai [87] showed a strong positive correlation between PU and the intention to use IoT technologies Gao and Bai [87]. Karahoca [88] demonstrated that tangible

performance-enhancing IoT devices are more readily adopted due to their high perceived usefulness [88].

Aziz [89] found that PU positively affects intention to use technology in the oil and gas sector in Malaysia Aziz [89]. Joo [90] emphasized that PU is a fundamental factor in shaping employees' attitudes toward technology, as it directly influences their intention to adopt and use it Joo [90]. Rahman [91] concluded in his research about AI adoption in the Malaysian banking sector that PU significantly influences intention to adopt AI in banking services Rahman [91]. Viet and Pham [92] found that PU positively affects intention to use digital banking in Vietnam [92].

Empirical studies on the adoption of e-payments have shown that perceived usefulness influences usage intention Francisco et al. [93], Wang et al. [94]. Francisco et al. discovered that users' attitudes regarding the payment tool are directly impacted by perceived utility Francisco et al. [93]. Cheng and Huang [95] concurred that mobile usage behavior is positively and directly impacted by the perceived utility of mobile ticketing services [94]. Wang et al. [94] found a positive correlation between behavioral intention to utilize mobile services and perceived usefulness [94].

Perceived usefulness had a significant influence on intention to use e-learning systems by students in Malaysia [96]. In Lebanon, Koksal showed that perceived usefulness and perceived ease of use of mobile banking were significant elements that distinguished customers with good intentions from others [92].

H₃: The perceived usefulness of AI positively influences the intention to use AI.

Numerous studies across various industries have confirmed the predictive strength of TAM in assessing users' perceptions of usefulness, ease of use, and their intention to adopt technology [36, 83]. The original TAM is considered a foundational model, consistently used to understand technology adoption in fields like information systems and human-computer interaction Trang [80]. Trang's [80] study revealed that both PU and PEOU positively influence the intention to use technology [80].

Similarly, Koksal [97] found that PU and PEOU are critical predictors of users' intention to adopt mobile banking applications in Lebanese banks [92]. These findings highlight the enduring relevance of TAM in predicting technology acceptance across different contexts.

Chocarro et al. [98] found that both PEOU and PU significantly contribute to the acceptance of chatbots in educational settings [98]. Moreover, the study highlighted that laissez-faire leadership positively affects PEOU, while transformational leadership enhances PU, suggesting that leadership styles play an important role in shaping perceptions of AI. Leaders who foster creativity and motivation can significantly influence how positively employees view the usefulness of AI in their organizations [64].

Despite the fact that PEOU only relates to the technical aspect of using a system, it remains a significant factor in technology adoption, particularly for users less familiar with new technologies. While some research shows that PEOU has a lesser impact on behavioral intention, it is still considered a critical determinant in many adoption contexts [36].

H₄: The perceived ease of use of AI positively influences the intention to use AI.

1.10. The relationship between Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of AI

Explaining the relationship between perceived ease of use and perceived usefulness, a study conducted by Hsu [99] concluded that perceived ease of use in small and medium manufacturers for manufacturing services of the innovative product development model has a positive impact on perceived usefulness.

In addition, the key factors impacting the term perceived usefulness are viewed as ease of use, Kitsios [28]. Shal [64] confirmed that perceived ease of use positively influences perceived usefulness of AI in academic libraries in higher education.

To assess the use of TAM in the e-learning system, a study was conducted on students in the Science Department at the College of Science and Technology, University Technology of Malaysia (UTM) City Campus. The findings indicated that PEOU has a favorable impact on PU [100].

The results of a study have also shown that there is a significant positive relationship between perceived ease of use and perceived usefulness of e-government for gathering information and conducting transactions in Jordan [101].

Based on the previous literature, the following hypothesis is proposed:

H₅ The perceived ease of use of AI positively influences the perceived usefulness of AI.
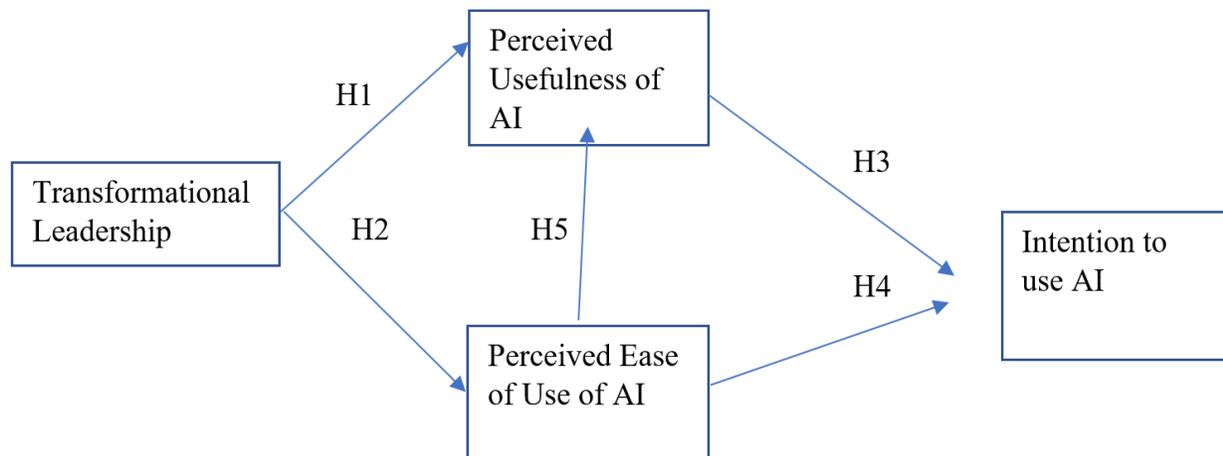
1.11. Research Model

Figure 2.
Research model.
Source: Shal [64].

2. Methodology
2.1. Research Design

The purpose of this study was to investigate how Lebanese bank leaders saw their intention to employ AI in connection with their leadership styles. The positivist paradigm served as the foundation for the study design, which emphasized scientific procedures and empirical observation as means of understanding the world [102]. As a result, a survey approach was used to gather information from 250 banking leaders systematically.

2.2. Research Instrument

This study used the survey technique. 5 points Likert scale was used for all items. TL was measured using Multi Factor Leadership Questionnaire 5× developed by Bass and Avolio [103] including 12 items, PU and PEOU were measured using 4 items for each, ITU was measured using 3 items As per Davis [26] the Cronbach's alpha for the TL scale is 0.838, for PU scale is 0.894, for PEOU is 0.822, and that for ITU is 0.740. The questionnaire is already validated [64].

2.3. Structural Equation Model

The researcher used SEM to test the relationship between transformational leadership style and intention to use AI. Amos 24 was used to construct the SEM between the variables under investigation. SEM is presented in Figure 3.

Figure 3.
Structural Equation Model.

2.4. Variables and Measures

The following table provides a comprehensive overview of the conceptual and operational definitions of the variables included in this study. The conceptual definitions outline the theoretical meaning of each construct as derived from the literature, while the operational definitions specify how these constructs are measured and applied within the context of the research.

Table 1.
Variable measurement.

Variable	Conceptual Definition	Operational Definition	No. of Items	Measurement: Likert Scale
Transformational Leadership	A leadership style that motivates and develops followers through idealized influence, inspirational motivation, intellectual stimulation, and individualized consideration Bass and Riggio [12].	Measured using the Multifactor Leadership Questionnaire (MLQ).	12	5-points
Perceived Ease of Use	The degree to which a person believes that using a system is simple Davis [26].	Measured using TAM scale items.	4	5-points
Perceived Usefulness	The degree to which a person believes that using a system is beneficial and enhances their job performance Davis [26].	Measured using TAM scale items.	4	5-points
Intention to Use AI	A person's intention to continue using a specific technology Davis [26].	Measured using adapted items from the TAM scale specific to AI adoption.	3	5-points

Source: Bass and Avolio [103], and Venkatesh and Davis [36].

2.5. Ethical Considerations

All participants were provided with a consent form explaining the purpose of the study, their role, and their right to withdraw at any time. Written consent was obtained before collecting any data. Participants' identities were protected by anonymizing responses and using coded identifiers. No personally identifiable information (e.g., names, job titles, or company names) was included in the final report. Data was stored securely on encrypted systems, accessible only to the researcher.

Before conducting the study, ethical approval was obtained from the Institutional Review Board at Beirut Arab University, ensuring compliance with academic and professional research standards.

3. Results

Descriptive statistics are presented in Table 2 show the mean and standard deviation of the variables.

Table 2.
Descriptive statistics.

Variable	Min.	Max.	Mean	Std. Dev.	Skewness	Kurtosis
Transformational Leadership	12.00	60.00	50.98	5.69	–1.166	3.172
Perceived Ease of Use (PEOU)	4.00	20.00	14.92	2.90	–0.251	0.003
Perceived Usefulness (PU)	4.00	20.00	15.12	3.39	–0.438	–0.185
Intention to Use (ITU)	3.00	15.00	10.84	2.50	–0.514	0.213

Transformational Leadership: Mean = 50.98, negatively skewed (-1.166) → Most values are higher, meaning many respondents rated transformational leadership highly. High kurtosis (3.172) → Distribution is peaked, indicating many responses are clustered around the mean.

Perceived Ease of Use (PEOU): Mean = 14.92, with a slight negative skew (-0.251) → Respondents generally rated PEOU positively. Kurtosis is close to zero, meaning a relatively normal distribution.

Perceived Usefulness (PU): Mean = 15.12, slightly higher than PEOU. Negative skew (-0.438) → Respondents tend to rate PU positively. Slight negative kurtosis (-0.185) suggests a slightly flatter distribution.

Intention to Use (ITU): Mean = 10.84. Moderate negative skew (-0.514) → More respondents rated ITU high. Positive kurtosis (0.213) → Slightly peaked distribution.

Transformational leadership has a strong positive impact on PEOU (β = 0.578, $p < 0.001$), indicating that transformational leaders enhance leaders' perception that new technologies are easy to use. PEOU and ITU showed a strong positive correlation (β = .522, $p < .001$), confirming that the easier a system is perceived to use, the more likely employees are to adopt it. PEOU and PU were also strongly correlated (β = .796, $p < .001$), reinforcing the Technology Acceptance Model (TAM) proposition that ease of use enhances perceived usefulness. ITU and PU had the strongest correlation (β = .677, $p < .001$), indicating that employees are more likely to adopt a system they find useful.

3.1. Reliability Test

Table 3.
Variable Reliability Scores.

Variables	No. of Items	Cronbach's Alpha (α)	Interpretation
Transformational leadership	12	**0.838**	Good reliability
Perceived ease of use	4	**0.822**	Good reliability
Perceived usefulness	4	**0.894**	Excellent reliability
Intention to use	3	**0.740**	Acceptable reliability

In summary, all subscales have good to excellent reliability ($\alpha > .70$).

3.2. Confirmatory Factor Analysis

CFA is being conducted using SPSS. Values show how much of the variance in each variable is accounted for by the extracted factors. Values closer to 1.000 mean more variance is explained by the factors (better fit). No multicollinearity since no high value (>0.8).

Table 4.
KMO and Barlett's Test.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.872
Barlett's Test of Sphericity	Chi-Square 3936.401 Df 496 Sig.<0.001

KMO checks how suitable the data is for factor analysis. It evaluates the proportion of variance among variables that might be common variance. KMO >0.8 reflects very good sample adequacy, and the data are suitable for factor analysis.

Bartlett's Test of Sphericity is statistically significant, $\chi^2(496) = 3936.00$, p < .001, indicating that the correlation matrix is not an identity matrix. This result supports the factorability of the correlation matrix.

3.3. Discriminant validity

Table 5.
Discriminant validity.

Construct	Item	Loading	AVE	Square root of AVE	correlations	Discriminant
Transformational	II1	1.156	0.9605135	0.980057906	–0.135	Valid
	II2	0.712			0.462	Valid
	II3	1				
	IC1	1.251				
	IC2	0.981				
	IC3	0.676				
	IM1	1.044				
	IM2	0.803				
	IM3	1.243				
	IS1	0.929				
	IS2	0.91				
	IS3	0.853				
Perceived Usefulness	PU1	1	1.5110685	1.229255262	0.681	Valid
	PU2	1.352				
	PU3	1.249				
	PU4	1.287				
Perceived Ease of Use	PEOU1	0.88	0.88874125	0.942730741	0.842	Valid
	PEOU2	0.934			0.517	Valid
	PEOU3	0.953				
	PEOU4	1				
Intention to Use	ITU1	1	0.836403	0.914550709	0.517	Valid
	ITU2	0.928			0.681	Valid
	ITU3	0.805				

It can be concluded that each construct in the model is empirically distinct from the others, confirming that the variables measure different concepts as intended.

3.4. Goodness of Fit

The goodness-of-fit indices are used to evaluate how well the proposed structural model fits the observed data. The table shows correlation significance after enhancing goodness of fit. The model maintains its rational structure.

- CMIN/DF (Chi-Square/Degrees of Freedom) = 2.278
  A value below 3 is generally considered an acceptable model fit. P-value = .000   suggests that the model is significantly different from the saturated model
- CFI (Comparative Fit Index) = 0.897, which compares the fit of the model to a null model (independence); the value is very good (almost 0.90).
- PCFI (Parsimonious Comparative Fit Index) = 0.759, which means that, adjusting for model simplicity, the value is acceptable (>0.50).
- RMSEA (Root Mean Square Error of Approximation) = 0.073; values below 0.10 indicate a reasonable fit. It measures fit per degree of freedom.
- HOELTER = 124 suggests the model can be improved by increasing sample size; a value >200 is considered adequate.

Table 6.
Hypotheses testing result summary.

Hypothesis	Estimate	S.E.	C.R.	P-value	Result
H1: TL & PU	–0.133	0.088	–1.504	0.133	Not supported
H2: TL & PEOU	0.578	0.130	4.435	***	Supported
H3: PU & ITU	0.677	0.125	5.401	***	Supported
H4: PEOU & ITU	0.522	0.116	4.517	***	Supported
H5: PEOU & PU	0.796	0.092	8.696	***	Supported

The table shows that H1 is not supported, and this does not align with most of the previous literature. H2, H3, H4, and H5 are supported, and this aligns with most of the previous literature.

4. Discussions

The results confirm that transformational leadership is an influential style in promoting technology adoption. Leaders who inspire, communicate a clear vision, and support employees' learning positively impact employees' perceptions of ease of use, usefulness, and willingness to adopt new technologies.

These findings align with previous studies [11, 12, 24, 64, 80] which highlight that transformational leaders create an environment conducive to change and innovation. Leaders who emphasize vision and motivation drive higher acceptance of digital transformation initiatives.

TL positively influences PEOU, meaning employees find technology easier to use when leaders provide guidance and motivation, and it has no significant impact on PU.

In the context of the Lebanese banking sector, the finding that transformational leadership positively influences perceived ease of use (PEOU) is relevant and particularly significant. It helps Lebanese banks, facing huge pressure regarding regulatory requirements, compliance due diligence, daily tasks, and financial crises, and operating in a highly volatile environment, to cope with crises and align with requirements to start the recovery phase by hiring adequate leadership style, such as transformational leaders; those who inspire, stimulate, and individually consider their team members. They play a crucial role in facilitating and leading the technological transition for employees.

The strong correlations between TAM's attributes (PEOU, ITU, and PU) support the Technology Acceptance Model (TAM), confirming that ease of use and perceived usefulness are critical factors in technology adoption. This is consistent with Davis [26], Kitsios [28], and Venkatesh and Davis [36], who proposed that users are more likely to adopt a system if they perceive it as both useful and easy to use.

Both PEOU and PU significantly impact ITU, indicating that these factors are essential drivers of technology adoption. These results align with Davis [26], who established TAM as a framework for understanding technology acceptance.

These findings also strongly align with the Technology Acceptance Model (TAM), which posits that individuals' behavioral intention to use technology is primarily impacted by their perceptions of its usefulness (PU) and ease of use (PEOU). Within this framework, it becomes evident that organizational context and leadership behavior are critical external variables that influence these cognitive beliefs. In the case of laissez-faire leadership, the absence of active guidance, support, and involvement appears not only insufficient in fostering these perceptions but may, in fact, actively erode them. The negative influence on both PU and PEOU suggests that when leadership withdraws from the digital transformation process, employees miss the clarity or motivation needed to build positive beliefs about technology.

In the Lebanese banking sector, laissez-faire behavior may lead to a void of direction and communication, and thereby resistance to change regarding the adoption and use of new technology, as they will be considered sources of risk or job insecurity.

4.1. Transformational Leadership and Perceived Ease of Use (PEOU)

The findings indicate a significant positive relationship between transformational leadership and PEOU (β = 0.578, p < 0.001). This suggests that leaders who consider their followers by practicing inspiration, stimulating, play a crucial role in forming favorable perceptions about the usability of new systems. Transformational leaders help followers mitigate risks and reduce anxiety. This will help deal with resistance to technological change. This aligns with most previous studies [11, 12, 24, 64, 80].

This result highlights the role of leadership in technology adoption. These findings reinforce the idea that transformational leadership is not only effective in driving performance but also in facilitating digital transitions and transformations.

4.2. Transformational Leadership and PU

Transformational (β = -0.133, p = 0.133) showed a non-significant direct effect on PU. This finding contradicts with a wider literature [11, 20, 64, 79-81].

This finding is interesting because it suggests that while transformational leadership enhances ease of use, it does not necessarily translate into greater perceptions of usefulness. One potential interpretation is that perceived usefulness is more influenced by task relevance and system functionality than by leadership style.

Another possible explanation lies in the indirect influence of leadership. It is plausible that transformational leadership affects PU through its impact on PEOU. Since PEOU significantly predicts PU (β = 0.796, p < 0.001), leadership may play a foundational role in establishing the perception of usefulness.

4.3. Perceived Usefulness and ITU

Perceived usefulness had the strongest influence on ITU (β = 0.677, p < 0.001), confirming TAM's principle that usefulness drives behavioral intention.

This finding aligns with a broader literature [28, 30-32, 35, 36, 82, 83, 85, 87, 88, 91, 97] which showed positive and direct relationship between PU and ITU of AI.

When users believe that a system will enhance their job performance, increase productivity, or simplify tasks, they are significantly more inclined to use it. Leaders and system developers should therefore focus on clearly communicating these benefits during implementation.

4.4. Perceived Ease of Use and ITU

PEOU also had a significant and substantial effect on ITU (β = 0.522, p < 0.001). This result suggests that ease of use not only contributes to perceived usefulness but also independently influences users' willingness to adopt technology.

This finding aligns with a wide literature [35, 36, 64, 80, 83, 88, 92, 97] which showed a positive and direct relationship between PEOU and ITU of AI.

The role of PEOU as a predictor of PU and ITU highlights its vital role in technology adoption frameworks. This further affirms the need for user-centered design and comprehensive training initiatives during system rollout.

4.5. Perceived Ease of Use and Perceived Usefulness

The relationship between perceived ease of use (PEOU) and perceived usefulness (PU) is strong and significant within the context of Lebanese banks, aligning closely with the assumptions of the Technology Acceptance Model (TAM). The correlation analysis revealed a positive relationship between PEOU and PU (r = .796, p < .001), indicating that employees who perceive banking technologies as easy to use are more likely to view them as useful in enhancing their daily tasks and enhancing job performance. This relationship was further validated by the SEM analysis, which demonstrated that PEOU had a strong and statistically significant direct effect on PU (β = 0.842, p < .001). These findings suggest that in the Lebanese banking sector, ease of use is a critical driver of perceived technological value. Given that the sector is subject to an increasing reliance on digital tools and platforms, ensuring that systems are user-friendly will directly enhance employees' perceptions of the practical benefits of using AI technology and ultimately facilitate acceptance of technological innovations.

These findings align with previous studies and literature [28, 64, 99-101].

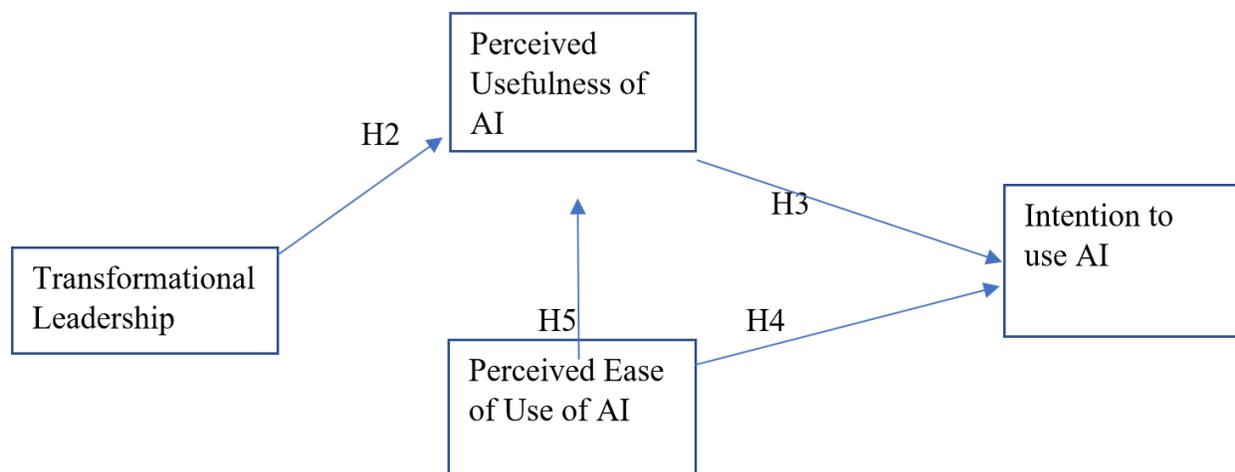### 4.6. Conceptual Model Concluded by the Research

Figure 4.
Conceptual model concluded by the research.

5. Conclusion

The findings highlight the critical and pivotal role of transformational leadership style in shaping leaders' perceptions and adoption of technology in organizations. The results suggest that organizations seeking to implement digital transformation should rely on transformational leadership to foster a positive technology adoption culture.

The findings suggest that transformational leadership plays a key role in enhancing technology adoption by improving ease of use. The study validates the Technology Acceptance Model (TAM) by demonstrating that PEOU and PU are critical determinants of ITU. This aligns with the core assumptions of TAM and provides valuable insights when examined within the actual situation of the Lebanese banking sector. In a sector marked by high regulatory pressure, economic volatility, and rapid digitalization needs, employees' acceptance of new technologies pivots on their ability to perceive usefulness and ease of use.

For practitioners, the implication is clear: banks seeking to adopt AI should invest in leadership development programs that emphasize transformational qualities such as vision, inspiration, and individualized consideration [12, 58, 70, 73]. By doing so, they can enhance employees' perceptions of ease of use and usefulness, ultimately driving greater acceptance of AI technology.

Moreover, since the Lebanese banking environment faces challenges regarding operational disturbances, customer dissatisfaction, and institutional doubt, the successful adoption of digital platforms and artificial intelligence is crucial to recover from reputational risk and restore efficiency and public trust. However, for such adoption to occur, bank leaders must be convinced that adopting these technologies will offer reliability, accessibility, and add value in enhancing task performance.

The significance of PU in this context reflects employees' aim for practical solutions that can directly address the sector's challenges, such as improving the quality of services provided, including speed, reducing manual workload, minimizing errors, and meeting customer expectations more effectively. If employees believe that the system will enhance their job outcomes, they are more likely to accept and use it, even amid broader organizational ambiguities.

Meanwhile, PEOU becomes particularly salient in a context where technological training may be inconsistent and where digital literacy levels vary across generations and job roles. Many Lebanese banks are undergoing restructuring and digital integration with limited resources, meaning that if systems are perceived as complicated or unsupported, they are likely to encounter resistance. The finding that PEOU is a significant driver of ITU suggests that user-friendly system design, intuitive interfaces, and adequate training/support infrastructure are non-negotiable for effective implementation.

Moreover, PEOU is not considered a mediator variable between transformational leadership and intention to use AI in Lebanese banks.

Crucially, the joint impact of PEOU and PU on ITU in this context also reinforces the importance of a holistic adoption strategy, one that addresses both the functional benefits of technology (usefulness) and the psychological readiness of employees to engage with it (ease of use). Lebanese banks cannot afford to treat technology adoption as a top-down mandate or a purely technical upgrade; it must be experienced at the user level as empowering, purposeful, and manageable.

In sum, this finding validates the TAM in a uniquely complex and constrained organizational environment. It highlights the need for Lebanese banks to adopt a user-centric and leadership-supported approach to digital transformation, one that ensures employees not only see the value in technology but also feel confident and competent in using it.

Future research could build upon this study by conducting longitudinal studies to capture evolving user perceptions, exploring other leadership styles and contextual variables, and using objective measures of system usage and performance outcomes. Such studies would enhance our understanding of the dynamic interplay between leadership, perception, and technology use.

List of Abbreviations:

AI	Artificial intelligence
TAM	Technology acceptance model
PU	Perceived usefulness
PEOU	Perceived ease of use
ITU	Intention to use
FRLT	Full range leadership theory
TL	Transformational leadership

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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References

[1]   S. Karthiga, " Artificial intelligence in banking industry," *Journal of Banking Innovation*, vol. 12, no. 3, pp. 45–60, 2024.

[2]   T. Eren, "Digital innovations in financial institutions," *International Journal of Finance*, vol. 8, no. 2, pp. 101–115, 2021.

[3]   M. Dobrescu, "Creative disruptions in banking channels," *Banking Technology Review*, vol. 15, no. 1, pp. 77–89, 2018.

[4]   R. Fares, "Artificial intelligence adoption in banking," *Journal of Financial Technology Studies*, vol. 5, no. 4, pp. 233–245, 2023.

[5]   M. Truby, "FinTech competition and regulation," *Financial Law Review*, vol. 9, no. 2, pp. 88–104, 2020.

[6]   M. I. Lukonga, "Fintech, inclusive growth and cyber risks: Focus on the MENAP and CCA regions," IMF Working Paper No. 18/201. International Monetary Fund, 2018.

[7]   A. Shmuratko, "Technology adoption challenges in banks," *Journal of Banking Systems*, vol. 11, no. 3, pp. 56–72, 2019.

[8]   Financial Stability Board, "Financial stability implications from FinTech: Supervisory and regulatory issues that merit authorities' attention (FSB Report). Financial Stability Board," 2017. https://www.fsb.org/wp-content/uploads/P270617.pdf

[9]   A. Alghazo, "Technology acceptance in banking," *International Journal of Information Systems*, vol. 6, no. 2, pp. 77–89, 2017.

[10]   M. Avidov-Ungar, "Leadership and digitalization," *Educational Leadership Review*, vol. 14, no. 1, pp. 33–47, 2022.

[11]   N. Ghamrawi and R. Tamim, "Digital leadership in higher education," *International Journal of Educational Management*, vol. 37, no. 2, pp. 145–162, 2023. https://doi.org/10.1007/s10639-022-11483-w

[12]   B. M. Bass and R. E. Riggio, *Transformational leadership*, 2nd ed. Mahwah, NJ, USA: Lawrence Erlbaum Associates, 2006.

[13]   B. M. Bass, *Leadership and performance beyond expectations*. New York, USA: Free Press, 1985.

[14]   P. G. Northouse, *Leadership: Theory and practice*, 8th ed. Thousand Oaks, CA, USA: Sage Publications, 2021.

[15]   S. Shan Ho and C. Chow, "AI adoption in Lebanese banks," *Journal of Banking Studies*, vol. 19, no. 1, pp. 55–70, 2023.

[16]   P. Makdissi, "Lebanon's compounded crises and banking sector," *Middle East Economic Review*, vol. 12, no. 4, pp. 201–220, 2023.

[17]   A. Al Ahmad, "Transformational leadership and innovation in Lebanese banks," *International Journal of Innovation Management*, vol. 23, no. 5, pp. 1–20, 2019.

[18]   H. Baba, "Creative leadership in FinTech adoption," *Journal of Financial Innovation*, vol. 7, no. 2, pp. 88–102, 2023.

[19]   F. Almeida, "Leadership style and IS adoption," *Information Systems Journal*, vol. 32, no. 3, pp. 233–250, 2022.

[20]   A. ElKhani, "ERP efficiency and transformational leadership," *Computers in Human Behavior*, vol. 35, pp. 120–129, 2014.

[21]   A. Krouska, "Extended TAM model," *Information Systems Frontiers*, vol. 24, no. 2, pp. 455–470, 2022.

[22]   A. Burton-Jones and G. Hubona, "The TAM model revisited," *Information & Management*, vol. 43, no. 6, pp. 872–886, 2006.

[23]   P. Legris, J. Ingham, and P. Collerette, "Why do people use information technology? A critical review of the technology acceptance model," *Information & Management*, vol. 40, no. 3, pp. 191-204, 2003. https://doi.org/10.1016/S0378-7206(01)00143-4

[24] J. Schepers, "Leadership and TAM in high-tech firms," *Journal of Service Management*, vol. 16, no. 4, pp. 123−135, 2005.

[25] R. Tannous, "AI adoption in Lebanon," *Lebanese Journal of Business Studies*, vol. 10, no. 2, pp. 77−95, 2022.

[26] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly*, vol. 13, no. 3, pp. 319-340, 1989. https://doi.org/10.2307/249008

[27] M. Dajani and S. Yaseen, "Technology acceptance model in banking," *International Journal of Business Research*, vol. 9, no. 2, pp. 77−89, 2016.

[28] D. Kitsios, "Digital banking adoption in Greece," *Journal of Enterprise Information Management*, vol. 34, no. 5, pp. 1234−1250, 2021.

[29] R. De Sena, "Mobile payment adoption factors," *Electronic Commerce Research and Applications*, vol. 17, pp. 120−134, 2016.

[30] E. de Luna, "Mobile payments adoption in Spain," *Telematics and Informatics*, vol. 38, pp. 50−64, 2019.

[31] Y. Kim, "Mobile payment acceptance in Korea," *Information Systems Frontiers*, vol. 12, no. 3, pp. 285−300, 2010.

[32] F. Liébana-Cabanillas, "Factors influencing mobile payment adoption," *Electronic Commerce Research and Applications*, vol. 35, pp. 100−112, 2020.

[33] X. Cao, "Mobile payment adoption in China," *Information Technology & People*, vol. 29, no. 3, pp. 456−478, 2016.

[34] R. Shankar and B. Datta, "Mobile payment adoption in India," *International Journal of Bank Marketing*, vol. 36, no. 2, pp. 146−163, 2018.

[35] S. Singh, "Mobile payment adoption in emerging markets," *Journal of Retailing and Consumer Services*, vol. 55, pp. 102−110, 2020.

[36] V. Venkatesh and F. D. Davis, "A theoretical extension of the technology acceptance model: Four longitudinal field studies," *Management Science*, vol. 46, no. 2, pp. 186-204, 2000. https://doi.org/10.1287/mnsc.46.2.186.11926

[37] A. Al-Maroof, "Perceived usefulness in technology adoption," *International Journal of Information Management*, vol. 40, pp. 100−110, 2018.

[38] P. Panagoulias, "AI adoption in healthcare," *Health Informatics Journal*, vol. 29, no. 1, pp. 77−95, 2023.

[39] J. Kelly, "Behavioral intention and AI adoption," *Journal of Business Research*, vol. 145, pp. 233−245, 2023.

[40] C. Hsieh, "Smart speakers and AI adoption," *Computers in Human Behavior*, vol. 124, pp. 106−118, 2021.

[41] A. Kumar, "E-wallet adoption in India," *Journal of Retailing and Consumer Services*, vol. 75, pp. 102−120, 2025.

[42] F. D. Davis, R. P. Bagozzi, and P. R. Warshaw, "Extrinsic and intrinsic motivation to use computers in the workplace 1," *Journal of Applied Social Psychology*, vol. 22, no. 14, pp. 1111-1132, 1992. https://doi.org/10.1111/j.1559-1816.1992.tb00945.x

[43] R. Prastiawan, "Mobile banking adoption in Indonesia," *Journal of Financial Services Marketing*, vol. 26, no. 3, pp. 233−245, 2021.

[44] N. Chairina, "Online service adoption in Indonesia," *International Journal of Business and Technology*, vol. 12, no. 2, pp. 88−97, 2021.

[45] R. Basuki, "E-wallet adoption in Indonesia," *Journal of Retailing and Consumer Services*, vol. 68, pp. 102−115, 2022.

[46] I. Ajzen and M. Fishbein, *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ, USA: Prentice Hall, 1980.

[47] O. Oyeleye, "Technology adoption in e-banking," *Journal of Internet Banking and Commerce*, vol. 20, no. 2, pp. 55−70, 2015.

[48] P. Hanafizadeh, "E-banking adoption in Iran," *Telematics and Informatics*, vol. 31, no. 1, pp. 62−78, 2014.

[49] M. Fishbein and I. Ajzen, *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA, USA: Addison-Wesley, 1975.

[50] I. Ajzen, "The theory of planned behavior," *Organizational Behavior and Human Decision Processes*, vol. 50, no. 2, pp. 179-211, 1991. https://doi.org/10.1016/0749-5978(91)90020-T

[51] V. Venkatesh, M. G. Morris, G. B. Davis, and F. D. Davis, "User acceptance of information technology: Toward a unified view1," *MIS Quarterly*, vol. 27, no. 3, pp. 425-478, 2003. https://doi.org/10.2307/30036540

[52] J. Baker, *The fundamentals of transformational leadership*. Boston, MA, USA: McGraw-Hill, 2013.

[53] P. Hallinger, "Exploring transformational leadership in education," *Educational Administration Quarterly*, vol. 28, no. 3, pp. 1−25, 1992.

[54] Y. Berson and B. J. Avolio, "Transformational leadership and organizational outcomes," *Leadership Quarterly*, vol. 15, no. 3, pp. 443−462, 2004.

[55] D. Van Knippenberg and S. B. Sitkin, "A critical assessment of charismatic—transformational leadership research: Back to the drawing board?," *Academy of Management Annals*, vol. 7, no. 1, pp. 1-60, 2013.

[56] A. Deinert, "Transformational leadership dimensions and outcomes," *Journal of Business Research*, vol. 68, no. 12, pp. 2736−2749, 2015.

[57] H. Bruch and F. Walter, "Leadership styles and organizational performance," *European Journal of Work and Organizational Psychology*, vol. 16, no. 1, pp. 1−22, 2007.

[58] J. Mudd-Fegett, "Trust and transformational leadership," *Journal of Organizational Change Management*, vol. 37, no. 2, pp. 145−162, 2024.

[59]   B. M. Bass, *Transformational leadership and organizational change*. New York, NY, USA: Free Press, 1998.

[60]   G. Vargas, "Transformational leadership in technology industries," *Technology Management Review*, vol. 12, no. 4, pp. 233–245, 2015.

[61]   S. Benmira and T. Agboola, "Leadership styles in innovation," *Journal of Business Strategy*, vol. 42, no. 3, pp. 55–67, 2021.

[62]   J. Villaluz and M. Hechanova, "Transformational leadership and organizational agility," *Leadership & Organization Development Journal*, vol. 40, no. 2, pp. 233–245, 2019.

[63]   N. Ghamrawi, "Transformational leadership in education," *International Journal of Educational Leadership*, vol. 21, no. 1, pp. 33–47, 2013.

[64]   M. Shal, "Leadership styles and AI adoption," *Journal of Technology and Leadership Studies*, vol. 12, no. 2, pp. 77–95, 2024.

[65]   M. Seyal, "Transformational leadership in Brunei institutions," *Asian Journal of Technology Innovation*, vol. 23, no. 3, pp. 145–162, 2015.

[66]   A. Imran, "Transformational leadership and organizational innovation," *International Journal of Innovation Management*, vol. 15, no. 2, pp. 233–250, 2011.

[67]   R. Khan, "Leadership qualities and technology adoption," *Journal of Organizational Change Management*, vol. 22, no. 4, pp. 55–72, 2009.

[68]   J. Humphreys, "Transformational leadership and emerging technology," *Journal of Leadership Studies*, vol. 8, no. 1, pp. 33–47, 2001.

[69]   N. Nusair, "Transformational leadership and innovation in Jordan," *Public Administration Review*, vol. 72, no. 3, pp. 233–245, 2012.

[70]   J. Covin, "Idealized influence and symbolic authority," *Journal of Business Venturing*, vol. 12, no. 3, pp. 145–162, 1997.

[71]   T. A. Judge and R. F. Piccolo, "Transformational and transactional leadership: A meta-analytic test of their relative validity," *Journal of Applied Psychology*, vol. 89, no. 5, p. 755, 2004.

[72]   T. Avolio, "Intellectual stimulation in leadership," *Leadership Quarterly*, vol. 10, no. 2, pp. 145–162, 1999.

[73]   T. Sitkin and A. Pablo, "Inspirational motivation and change," *Academy of Management Review*, vol. 30, no. 1, pp. 77–95, 2005.

[74]   D. Amanchukwu, "Leadership styles and organizational effectiveness," *International Journal of Business and Management*, vol. 10, no. 3, pp. 233–245, 2015.

[75]   S. Alblooshi, "Transformational leadership and organizational innovation," *Journal of Organizational Change Management*, vol. 33, no. 2, pp. 145–162, 2020.

[76]   H. Liao, "Transformational leadership and group goals," *Journal of Applied Psychology*, vol. 102, no. 3, pp. 233–245, 2017.

[77]   M. Kariman, "Transformational leadership and TAM in higher education," *International Journal of Educational Technology*, vol. 12, no. 2, pp. 77–95, 2022.

[78]   J. Halbach, "Mobile commerce adoption and leadership," *Journal of Retailing and Consumer Services*, vol. 18, no. 4, pp. 233–245, 2011.

[79]   J. Schepers, "Transformational leadership and TAM in high-tech firms," *Journal of Service Management*, vol. 16, no. 4, pp. 123–135, 2005.

[80]   N. Trang, "Transformational leadership and digital technology adoption in Vietnam," *Journal of Information Systems*, vol. 29, no. 2, pp. 145–162, 2024.

[81]   D. Van Dun, "Transformational leadership and Industry 4.0 adoption," *Journal of Manufacturing Technology Management*, vol. 34, no. 3, pp. 233–245, 2023.

[82]   C. Tsai, "Perceived usefulness and intention to use technology," *Computers in Human Behavior*, vol. 95, pp. 233–245, 2019.

[83]   J. Asua, "Technology acceptance in organizations," *Information Systems Journal*, vol. 22, no. 3, pp. 145–162, 2012.

[84]   J. Park, "Digital banking adoption and TAM," *Journal of Banking Technology*, vol. 37, no. 2, pp. 233–245, 2023.

[85]   J. Lara-Rubio, "Mobile payments adoption in Spain,," *Telematics and Informatics*, vol. 38, pp. 50–64, 2021.

[86]   S. Mital, "Technology adoption and performance," *Journal of Business Research*, vol. 88, pp. 233–245, 2018.

[87]   L. Gao and X. Bai, "IoT adoption and perceived usefulness," *Information Systems Frontiers*, vol. 16, no. 2, pp. 233–245, 2014.

[88]   D. Karahoca, "IoT adoption and smart devices," *Computers in Human Behavior* vol. 85, pp. 233–245, 2018.

[89]   A. Aziz, "Technology adoption in oil and gas sector," *Journal of Petroleum Technology*, vol. 72, no. 3, pp. 233–245, 2020.

[90]   J. Joo, "Perceived usefulness and technology adoption," *Information & Management*, vol. 55, no. 2, pp. 233–245, 2018.

[91]   M. Rahman, "AI adoption in Malaysian banking," *Journal of Banking Studies*, vol. 19, no. 1, pp. 55–70, 2023.

[92]   T. Viet and D. K. Pham, "Digital banking adoption in Vietnam: An application of UTAUT2 model," *Webology*, vol. 19, no. 1, pp. 3243-3262, 2022.

[93]   X. Francisco, Y. Cheng, and Z. Huang, "Perceived usefulness and mobile ticketing adoption," *Journal of Mobile Research*, vol. 12, no. 3, pp. 45–59, 2018.

[94] A. Wang, B. Lee, and C. Kim, "Behavioral intention for mobile services: The role of perceived usefulness," *International Journal of Electronic Payments*, vol. 5, no. 1, pp. 23–38, 2019.

[95] Y.-H. Cheng and T.-Y. Huang, "High-speed rail passengers' mobile ticketing adoption," *Transportation Research Part C: Emerging Technologies*, vol. 30, pp. 143–160, 2013.

[96] A. Tarhini, K. Hone, and X. Liu, "The effects of individual differences on e-learning users' behaviour in developing countries: A structural equation model," *Computers in Human Behavior*, vol. 41, pp. 153-163, 2014. https://doi.org/10.1016/j.chb.2014.09.020

[97] M. H. Koksal, "The intentions of Lebanese consumers to adopt mobile banking," *International Journal of Bank Marketing*, vol. 34, no. 3, pp. 327-346, 2016. https://doi.org/10.1108/IJBM-03-2015-0025

[98] R. Chocarro, M. Cortiñas, and G. Marcos-Matás, "Teachers' attitudes toward chatbots in education: The influence of perceived usefulness and perceived ease of use," *Computers & Education*, vol. 170, p. 104222, 2021.

[99] C.-L. Hsu, "Examining the impact of perceived ease of use on perceived usefulness in innovative product development services among small and medium manufacturers," *Industrial Marketing Management*, vol. 54, pp. 54–64, 2016.

[100] M. Masrom, "Technology acceptance model and e-learning," *University Technology Malaysia Journal*, vol. 2, no. 2, pp. 22–30, 2007.

[101] S. Almahamid, M. H. Shah, and H. Al-Khalifa, "Acceptance of e-government services in Jordan: The impact of perceived ease of use and perceived usefulness," *International Journal of Digital Society*, vol. 1, no. 2, pp. 45–55, 2010.

[102] M. J. Goertzen, "Trustworthiness in qualitative research," *The Qualitative Report*, vol. 22, no. 2, pp. 334–351, 2017.

[103] B. M. Bass and B. J. Avolio, *MLQ multifactor leadership questionnaire: Technical report*. Menlo Park, CA, USA: Mind Garden, Inc, 1995.