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Drivers and Barriers to Technology Adoption in Iraqi Public Universities: The Role of Behavioral Resistance, Organizational Readiness, and Communication Quality

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ABSTRACT

This study investigates the drivers and barriers to technology adoption (TA) in Iraqi public universities, focusing on the effects of behavioral resistance (BR) and organizational readiness (OR). It further examines the mediating role of communication quality (CQ) to understand how higher education institutions can enhance adoption outcomes. A quantitative, cross-sectional survey design was employed, targeting academic staff members from five major Iraqi public universities (Al-Mustansiriya University, University of Anbar, University of Baghdad, University of Basrah, and University of Kufa). A stratified random sampling technique was adopted to ensure proportional representation across faculties and academic ranks. 311 valid responses were retained, representing a usable response rate of 62.2%. Data were analyzed using PLS-SEM to test the hypothesized relationships. The results reveal that BR negatively affects TA, whereas OR has a significant positive impact. BR reduces CQ, while OR enhances it. Moreover, CQ positively affects TA and mediates the relationship between OR and TA, confirming that readiness alone is insufficient without effective communication. However, CQ did not significantly weaken the negative impact of BR on TA. This study contributes to the TA literature by integrating BR, OR, and CQ into a single framework, providing a holistic explanation of the drivers and barriers to TA in higher education. It empirically validates the mediating role of CQ and challenges the assumption that communication alone can mitigate resistance, suggesting the need for additional interventions to overcome resistance.

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العوامل المحفِّزة والمعوِّقة لاعتماد التكنولوجيا في الجامعات العراقية الحكومية: دراسة في دور المقاومة السلوكية، الجاهزية التنظيمية، وجودة التواصل

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المستلخص

تتناول هذه الدراسة العوامل الدافعة والمعوقات لاعتماد التكنولوجيا (TA) في الجامعات الحكومية العراقية، مع التركيز على تأثير المقاومة السلوكية (BR) والجاهزية التنظيمية (OR) . كما تبحث في الدور الوسيط لجودة التواصل (CQ) لفهم كيفية تعزيز مؤسسات التعليم العالي لنتائج الاعتماد. اعتمدت الدراسة على تصميم كمي بمسح مقطعي، استهدف أعضاء الهيئة التدريسية في خمس جامعات حكومية رئيسية في العراق (جامعة المستنصرية، جامعة الأنبار، جامعة بغداد، جامعة البصرة، وجامعة الكوفة). تم استخدام أسلوب العينة العشوائية الطبقية لضمان التمثيل النسبي عبر الكليات والمراتب الأكاديمية. وقد تم الاحتفاظ بـ311 استبانة صالحة للتحليل، بمعدل استجابة فعّال بلغ 62.2%. جرى تحليل البيانات باستخدام أسلوب النمذجة بالمعادلات البنائية الجزئية (PLS-SEM) لاختبار العلاقات المفترضة. أظهرت النتائج أن المقاومة السلوكية تؤثر سلباً على اعتماد التكنولوجيا، في حين أن الجاهزية التنظيمية لها تأثير إيجابي كبير. كما تبين أن المقاومة السلوكية تقلل من جودة التواصل، بينما تعززها الجاهزية التنظيمية. علاوة على ذلك، تؤثر جودة التواصل إيجابياً على اعتماد التكنولوجيا، وتؤدي دوراً وسيطاً بين الجاهزية التنظيمية واعتماد التكنولوجيا، مما يؤكد أن الجاهزية وحدها غير كافية من دون تواصل فعّال. ومع ذلك، لم تُضعف جودة التواصل بشكل كبير التأثير السلبي للمقاومة السلوكية على اعتماد التكنولوجيا. تسهم هذه الدراسة في إثراء أدبيات اعتماد التكنولوجيا من خلال دمج المقاومة السلوكية والجاهزية التنظيمية وجودة التواصل في إطار واحد، مما يوفر تفسيراً شاملاً للعوامل الدافعة والمعوقة لاعتماد التكنولوجيا في التعليم العالي. كما تؤكد على الدور الوسيط لجودة التواصل، وتنتقد الافتراض القائل بأن التواصل وحده قادر على التخفيف من المقاومة، مشيرة إلى الحاجة لتدخلات إضافية لتجاوزها.

الكلمات المفتاحية: *اعتماد التكنولوجيا؛ المقاومة السلوكية؛ الجاهزية التنظيمية؛ جودة التواصل؛ الجامعات الحكومية العراقية*

1. Introduction

In the contemporary digital landscape, technology adoption (TA) is no longer a mere operational upgrade but a strategic imperative for organizational survival and competitiveness (Rehman Khan et al, 2022: 12; Vial, 2021: 34). Despite the recognized benefits of digital transformation, many organizations, particularly in emerging markets and dynamic industries, struggle with low adoption rates and failed implementations (Kalambo et al., 2024: 7). While much of the prior research has emphasized technical, economic, and environmental factors influencing adoption, the behavioral and organizational dimensions remain underexplored, especially concerning the human resistance that often undermines technological change (Saghafian et al., 2021: 246). Behavioral resistance (BR) presents one of the most persistent barriers to TA, encompassing cognitive misunderstandings, emotional apprehensions, and observable avoidance behaviors (Laumer & Eckhardt, 2011: 73).

Employees' perceptions of risk, whether linked to job security, data privacy, or the reliability of new systems, further deepen this resistance (Haddara & Moen, 2017: 862). At the same time, organizational readiness (OR) characterized by leadership support, resources availability, and staff ability could be essential facilitator that would be ready to facilitate a seamless adoption process (Sharma & Venkatraman, 2023: 203). However, in organizations where it has been well prepared, adoption can fail when communication is disoriented, unreliable or not uniform. Quality of communication (CQ) is one of the key mediating factors in the elimination of resistance and promotion of readiness. High quality communication characterized by transparent messaging, regular updates, and effective feedback mechanisms helps align stakeholders' expectations, reduces uncertainty, and promotes a shared vision for technological change (Yu et al., 2023: 460; Zerfass & Brockhaus, 2023: 242). Unfortunately, most organizations do not apply communication as a strategical tool; this causes a disparate adoption process and lower innovation culture. Although the area of BR-OR-communication processes intersection is highly noted as critical, there are still few studies incorporating these relationships in the situations of TA (Laumer & Eckhardt, 2011: 73; Saghafian et al., 2021: 247). In addition, limited literature exists examining the impacts of these dynamics on the important adoption-related outcomes of actual usage, compatibility of the system with existing systems, and the trialability of the people to test the technology before large-scale adoption (Haddara & Moen, 2017: 861; Rehman Khan et al., 2022: 12). The proposed study will fill these gaps through the study of a driver and barrier of TA, which focuses on the BR as well as OR dimension, and how the latter aspect mediates the former. The participants of the study are lecturers based in renowned Iraqi state universities where the issue of digital transformation in education is an urgent challenge and one of the primary strategies (Abdullah & Ahmed, 2024: 85; Serin, 2022: 199). Thus, the study proceeds the literature with the more sophisticated explanation of TA in higher education institutions in the context of emerging economies and has something practical to say to leaders operating in the maze of the digital transformation.

2. Literature Review

Technology adoption (TA) is a complicated organizational procedure developed by a blend of enabling and inhibiting factors (Yadegari et al., 2024: 1202). Much is known about the positive effects of the adoption of innovative technologies such as operational efficiency, competitive advantage, organizational agility, and yet many companies find it difficult to succeed in the results of adoption (Mathur et al., 2023: 745). Research mainly consumed in the past has leaned towards the technological and organizational factors of adoption, which include usability of the systems, organizational support (leaders), and organizational resources (Xue et al., 2024: 9). Yet, other seemingly less explored barriers to adoption may be the human and Behavioral factors related to the resistance to adoption by the employees in particular, and the workforce, in general (Rahman et al., 2024: 12). Behavioral resistance (BR) represents a multidimensional phenomenon not only referring to surface-level resistance to change but also to more profound latent cognitive, emotional, and Behavioral resistance (Cieslak & Valor, 2025: 7). This opposition may prevent the users to explore, test and finally adopt new technologies, and thereby restrict their real consumption as well as compatibility with their present workflows and trialability. In this way, the behavioral aspect of resistance should be comprehended to enhance TA techniques, especially in a rapidly transforming fast-paced digital context. Also, modern research claims that BR reduction might not be sufficient, and it is essential to supplement it with the improvement of organizational readiness (OR) and the promotion of open communications (Samara et al., 2025: 1106). These forcing functions and

restraints ultimately decide the success of organizations in integrating the new technologies in their routine practices. Thus, the current study looks into how BR and OR are impacting the creation of TA and communication quality (CQ) is a tempering mechanism where higher communication quality facilitates this occurrence and when lower communication quality impedes this connection.

2.1 Behavioral Resistance and Technology Adoption

BR is considered one of the most obstinate challenges to TA in the organizational context. Particularly, BR is psychological and emotional reflex reaction of employees to change in the organization, unlike structural or technical barriers (Rahman et al., 2024: 12). The reason of resistance could be differences in factors like a lack of understanding (cognitive resistance), or due to emotional factors, like fear or an inference of anxiety (emotional resistance), as well as behavioral intentions (the observation of avoidance), and perceived risk of a negative consequence like a loss of employment, or a threat to cyber security (Cieslak & Valor, 2025: 9; Noriega Del Valle et al., 2024: 6). Such modes of resistance affect the readiness of employees to adopt new technologies, which reduces their utilization, lowers perceived compatibility of the technology with the current working patterns, and dissuades experimentation or trialability. In cases where the technology is technically valid and the resources are present, still, resistant employees would reject, avoid or delay the use of the technology, thus hindering the diffusion process (Saputra et al., 2022: 19).

Based on Theory of Planned Behavior (TPB), it can be suggested that such resistant behaviors may be accredited to having negative attitudes, poor subjective norms, and poor perceived behavioral control over technology use (Ajzen, 1991: 205). The negative perception by employees on the usefulness of the technology as well as the feelings of being emotionally uncomfortable and inability to handle the change result into behavioral intentions which act in impending the adoption effectively. According to this, TA is not only a technical application but a behavioral mechanism that is affected by both cognition of the person and emotions (Saputra et al., 2022: 20). Such resistance is further enhanced in the organizational environment, especially, in the situation of developing nations and hyper-competitive service industries coupled with poorly executed change ideals, irregular leadership attendance, and lack of employee input into decision-making processes (Mathur et al., 2023: 741). Unless the given barriers to the human elements are overcome, the overall process of the technological investments being transformed into productive use may prove to be challenging to organizations. As a result, BR presents a decisive discrepancy between technology availability and its realization. Employees may choose not to integrate the new system into their daily workflows, fail to experiment with its features, or perceive it as incompatible with their job roles. This negative behavioral response undermines the organization's ability to achieve the intended improvements in efficiency, quality, or innovation through TA. Accordingly, this study proposes the following hypothesis:

H1: behavioral resistance negatively affects technology adoption.

2.2 Organizational Readiness and Technology Adoption

OR plays a critical role in shaping how successfully technology is adopted within firms, particularly in dynamic and uncertain environments. Readiness refers to the extent to which an organization possesses the strategic intent, resources, and employee capability required to implement new technologies effectively (Mathur et al., 2023: 742). Unlike external environmental factors, OR reflects internal conditions that can be shaped and developed proactively by leadership and management teams. The dimensions of OR leadership support, resource availability, and employee capability reflect an organization's preparedness to undertake technological change. Leadership

support involves top management's active engagement in communicating the vision for TA, allocating sufficient resources, and fostering a positive climate for change (Molinillo & Japutra, 2017: 41). Without clear commitment from leadership, employees may perceive technology initiatives as low priority, leading to disengagement and implementation gaps (Kumar et al., 2024: 131).

Resource availability, comprising financial, technical, and human capital, is equally essential. Organizations that lack sufficient financial investment or technical infrastructure often struggle with delays, poor system performance, or incomplete implementations (Khan et al., 2025: 73). Moreover, human resource readiness reflected in employee capability ensures that employees possess the necessary skills and knowledge to work with the new technology (Mathur et al., 2023: 740). Skill gaps among employees are frequently cited as barriers to realizing the full potential of technological investments, particularly in emerging markets (Samara et al., 2025: 1107). Studies on digital transformation emphasize that even when the technology itself is user-friendly and well-designed, insufficient OR can hinder its adoption (Saputra et al., 2022: 19). Organizations with higher levels of readiness are more likely to achieve greater actual usage of the technology, improve its compatibility with existing workflows, and provide trialability opportunities that ease employee learning curves. Accordingly, OR functions as a key enabler, strengthening the organization's capacity to integrate new technologies into daily operations and aligning technological innovation with strategic goals. Based on this understanding, the following hypothesis is proposed:

H2: Organizational readiness for change positively affects technology adoption.

2.3 Behavioral Resistance and Communication Quality

BR, while primarily conceptualized as a barrier to TA, also impacts the broader organizational climate, including the quality of communication during technology implementation efforts. By reinforcing the reluctance of change, the employees will become less inclined to have open discussions, vent their concerns in a constructive way or become involved in feedback exercises (Rahman et al., 2024: 13). However, they can sometimes resist which usually results in decreased communication transparency, less responsiveness, and inability to exchange information among employees and the management (Noriega Del Valle et al., 2024: 5). BR is reflected at the cognitive, emotional and behavioral levels. When an employee feels a cognitive resistance, i.e., develops insufficient understanding and negative attitudes to new technologies, they can refuse to cooperate in conversations or accept something that the management gives messages about (Mathur et al., 2023: 742). In the same regard, employees might be demotivated to stay connected to the communication channels either due to deep-seated fear, stressful or struggling to adapt to the frustrating environment by skipping meetings or feedbacks (Cieslak & Valor, 2025: 7). When the behavioral intentions involve active shunning or negative reception to bringing in technology initiatives, employees might actively fail to provide feedback or aspire resistance to information sharing that might aid in the adoption. Additionally, the other perceived risk factors of TA like the concerns of losing a job or being spied may trigger employees to develop mistrust towards the organizational communication.

Consequently, they can interpret the messages of the management as biased or incomplete, which worsens the quality of communication within organizations even more (Khan et al., 2025: 74). By doing so, BR will foster communication failures that minimize the level of transparency, feedback and failure of the flow of updates on the basis of the technology. Other literature has reiterated the importance of communication that is transparent, sufficiently updated, and prompt feedback systems to get past resistance (Samara et al., 2025: 1105). Therefore, in the presence of BR, CQ is

likely to deteriorate, reducing the organization's ability to align employees around the goals and benefits of TA. Based on this rationale, the following hypothesis is proposed:

H3: Behavioral resistance negatively affects communication quality.

2.4 Organizational Readiness and Communication Quality

OR not only influences the technical and structural capacity for TA but also plays a significant role in shaping the quality of internal communication throughout the change process. Organizations that are better prepared through supportive leadership, adequate resources, and capable employees tend to create an environment where communication is open, transparent, and continuous (Mathur et al., 2023: 741; Saadi, 2023: 245). In such contexts, communication is not limited to top-down directives but includes meaningful two-way dialogues that address employee concerns and build trust. Leadership support, as a key component of readiness, encourages leaders to communicate a clear vision for TA, explain the rationale behind the change, and actively listen to employee feedback (Molinillo & Japutra, 2017: 39). Leaders who are engaged and approachable foster a climate where employees feel safe to express doubts, reducing the fear and uncertainty that often surround technological transitions (Khan et al., 2025: 77).

In addition, resource availability including financial, technical, and human capital ensures that communication channels (such as digital platforms, training sessions, and meetings) are well-equipped to disseminate timely and relevant information. Without sufficient resources, CQ often suffers, as organizations struggle to maintain consistent updates or provide forums for discussion (Mathur et al., 2023: 742). Finally, employee capability, reflecting staff competence and digital literacy, contributes to effective communication by enabling employees to comprehend, interpret, and engage with technology-related messages. Skilled employees are more likely to participate actively in feedback mechanisms, ask informed questions, and contribute ideas to improve implementation (Saputra et al., 2022: 20). Conversely, organizations with low readiness may face employee disengagement, misunderstanding, or passive acceptance of poor communication practices. Thus, OR not only prepares the technical ground for TA but also enhances CQ, characterized by frequent updates, transparent messaging, and responsive feedback mechanisms. By fostering an open communication culture, readiness reduces uncertainty and aligns stakeholders across different organizational levels, making TA smoother and more collaborative (Khan et al., 2025: 74). In lite of this, the following hypothesis is proposed:

H4: Organizational readiness for change positively affects Communication quality.

2.5 Communication Quality and Technology Adoption

Effective communication is essential for driving TA within organizations. Beyond simply transmitting information, CQ shapes how employees perceive, engage with, and ultimately adopt new technologies (Mathur et al., 2023: 741). High-quality communication fosters a shared understanding of technological changes, reduces uncertainty, and facilitates organizational alignment during adoption processes. CQ is multidimensional, encompassing feedback mechanisms, transparency, and communication frequency. First, feedback mechanisms create channels through which employees can express concerns, ask questions, and provide suggestions regarding the technology. Open feedback loops promote employee engagement and ownership of the adoption process (Khan et al., 2025: 74). Second, transparency builds trust by ensuring that both the benefits and challenges of the technology implementation are clearly communicated, minimizing rumors and resistance (Saputra et al., 2022: 19). Third, the frequency of communication regular updates on progress, timelines, and user support keeps employees informed and involved throughout the adoption journey (Rahman et al., 2024: 13).

When CQ is high, employees are more likely to experiment with new technologies (trialability), perceive them as fitting within existing processes (compatibility), and integrate them into their daily workflows (actual usage). Conversely, poor communication characterized by inconsistent messages, lack of clarity, or unresponsiveness can exacerbate resistance, confusion, and disengagement, ultimately impeding TA (Cieslak & Valor, 2025: 9). Empirical studies consistently support the positive role of communication in facilitating change and adoption outcomes. For example, Mathur et al. (2023: 742) found that transparent and frequent communication enhances user readiness and reduces technology-related anxiety. Similarly, Samara et al. (2025: 1109) reported that responsive feedback mechanisms improve technology acceptance, especially in complex organizational environments. Based on this evidence, it is reasonable to posit that CQ directly promotes TA by improving employee understanding, reducing uncertainty, and encouraging proactive engagement with new systems. Accordingly, the following hypothesis is proposed:

H5: Communication quality positively affects technology adoption.

2.6 Communication Quality, Organizational Readiness, and Technology Adoption

OR not only equips firms with the technical and human resources necessary for TA but also cultivates an environment where high-quality communication practices flourish. Communication serves as the conduit through which readiness is translated into action, enabling employees to understand, engage with, and implement technological change effectively (Khan et al., 2025: 72). Without effective communication, even well-resourced organizations may struggle to realize the full benefits of their readiness efforts. Organizations with strong leadership support typically ensure that communication regarding TA is clear, consistent, and inclusive. Supporting change through the leaders leads to transparency on the adoption process and the alignment of teams to a coherent vision and the free platforms to answer employee concerns (Molinillo & Japutra, 2017: 39). Such communication activities decrease the ambiguity, and it makes the employees more willing to explore new technologies. Likewise, the presence of resources like training platforms, collaborative tools, and IT support augment the potential of the organization toward the conveying of relevant and timely communication during the adoption process (Mathur et al., 2023: 742). The availability of appropriate information and support leads to confidence and the likelihood of the employees utilizing the technology to a greater extent, compatibility, and trialability. The other aspect of readiness is employee capability that allows the staff to not only comprehend technical communications but also to participate in them. The two-way communication will also be more likely when the employees are of high caliber, which gives useful feedback that would help enhance the technology implementation process (Saputra et al., 2022: 23). Such knowledge sharing between the employees and the management leads to making the TA initiatives effective (Saadi & Razak, 2019: 185).

Studies justify the opinion that CQ mediates the correlation between OR and TA. Mathur et al. (2023: 740) discovered that organizations that possess effective leaders and the readiness to their resources have better communication, thus resulting in higher engagement of employees and success of adoption. Similarly, Samara et al. (2025: 1105) pointed out that CQ facilitates the connection between readiness dimensions and TA behaviors that can be translated into action. In such a way, CQ serves as a mediator and illustrates the way in which OR provokes a climate that would promote TA. Effectively planned organizations tend to communicate and it is this enhanced communication leading to increased TA. Accordingly, the following hypothesis is proposed:

H6: Communication quality mediates the positive relationship between organizational readiness and technology adoption.

2.7 Communication Quality, Behavioral Resistance, and Technology Adoption

CQ plays a pivotal mediating role in shaping the relationship between BR and TA. Despite the fact that BR is commonly seen as a key obstacle by facilitating the adoption of the new technologies, communication can also be regarded as a mediating factor that will assist the organization in coping with and overcoming resistance (Rahman et al., 2024: 11; Rehman Khan et al., 2022: 12). High-quality communication, expressed in transparency, constant feedback, and frequent engagement can help organizations change the attitude and behavior caused by resistance to adoption of technological changes into openness and eagerness to change. In the cases of BR taking the form of cognitive resistance, employees can have wrong or sketchy ideas about the purpose or positive effects of the technology. Clear communication has the potential to demystify the beliefs leading to less confusion and acceptance (Mathur et al., 2023: 741). Likewise, the emotional resistance, when strengthened by fear and anxiety, could be reduced when the leadership offers encouraging words, trustful, and authentic communication, and ensures psychological safety (Cieslak & Valor, 2025: 7). Moreover, behavioral intent like avoidance and rejection has to be addressed using active communication tactics that are based on encouraging participation and dialogue, and engaging in a common problem management (Saputra et al., 2022: 19).

Quality communication further concerns the risks that are perceived as it is a great motivator of BR to discuss possible risks like job displacement or system failures and detail the things that can be done to counter such perceived risks (Samara et al., 2025: 1105). Organizations can calm such anxiety by minimizing ambiguity and therefore foster trust, a precondition of elevated levels of TA. According to the previous studies, in the case of poor communication, BR will likely block TA immediately, and there is hardly any chance to redo external factors and change the attitude of the employees (Rahman et al., 2024: 11). On the contrary, when CQ is high, resistance could be present but with lower negative effects when adopting the organization. CQ then acts as a mediator mechanism and it indicates the way through which the BR can affect the outcomes of TA. Based on that, the current research proposes that CQ mediates the connections between BR and TA, thereby filtering out the adverse effects of resistance on the success of adoption. The following hypothesis reflects this relationship:

H7: Communication quality mediates the negative relationship between behavioral resistance and technology adoption.

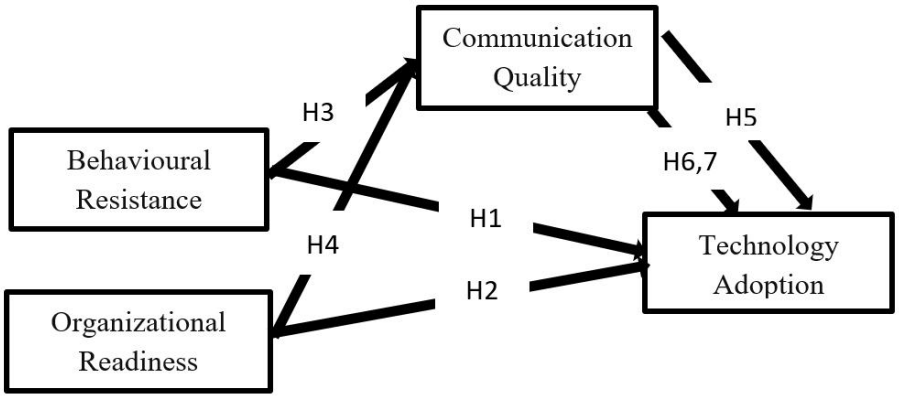

Figure (1): Conceptual Framework

3. Theories of the Study

This paper is based on synthesis of both established organizational and behavioral theories in explaining the motivation and the challenges affecting the adoption of technology (TA). The theoretical framework combines the Technology-Organization-Environment (TOE) Framework, Theory of Planned Behavior (TPB) and Change Communication Theory to form a broader perspective that would analyze the influence of organizational and behavioral aspects on TA outcomes.

3.1 Technology-Organization-Environment (TOE) Framework

TOE Framework proposed by Tomatzky & Fleischer (1990: 38) explains that the adoption of technology in organizations within any given context is affected by three major contexts; technology, organization and environment. Organizational readiness (OR) in terms of leadership support, resource availability, and employee capability is the structure of the internal surrounding of the organizations presented in the context of this research, defining the ability to implement the new technologies (Mathur et al., 2023: 740). The TOE framework underlines the fact that adoption does not happen merely based on the technical characteristics of a system the dot rather happens basing on the organization itself being ready and prepared.

3.2 Theory of Planned Behavior (TPB)

A Behavioural perspective of resistance is given by the TPB (Ajzen, 1991: 202). Behavioural resistance (BR) is in harmony with the dark side of the intention-formation as cognitive, Emotional, and Behavioural reactions determine the unwillingness of the employees to use a new technology. Based on TPB, the behavioural intentions and perceived control influence the actual behaviours in this matter that is the adoption of technology. Resistance comes up when the employees realize that there is high risk of adopting the technology or there is little suitability between technology and the employees and hence, they lack the motivation to adopt it (Saputra et al., 2022: 22).

3.3 Change Communication Theory

Communication is a critical aspect in the implementation of change in an organization and it helps in dissolving resistance. The Theory of Change Communication is based on the importance of transparent, frequent, and responsive communications that would facilitate trust in employees, decrease uncertainty, and stimulate their readiness to change (Dehghani Soltani et al., 2021: 79). Communication quality (CQ) is used in this case as a tool through which organizations can overcome resistance and use readiness, which improves the results of TA. Quality communication helps the organizations to provide reasons behind changes, reassure fears, and establish a common knowledge regarding the usefulness of the technology.

3.4 Theoretical Integration

Uniting these three points of view, the research hypothesis informs that BR has a detrimental impact on TA, which can be reduced through efficient communication. On the other hand, OR has a positive influence on adoption, mostly due to its ability to create the environment of free and transparent communication. CQ, therefore, is one of the important mediating mechanisms that reveal the relationship between resistance and readiness and adaptation outcomes. Combination of TOE, TPB and Change Communication Theory offers an effective theoretical framework to study the interaction between the behavioral, organizational and communication influences in defining TA.

4. Methodology

4.1 Research Population and Sampling

The quantitative research design will be used to analyse the variables affecting technology adoption (TA) in Iraqi public universities in this study. As the integration of technology in the educational environment of higher educational institutions is a complex task, particularly in developing countries, the university lecturers form a sensitive group, whose perception and experience are a significant contributor to adoption outputs (Granić & Marangunić, 2019: 2575; Rehman Khan et al., 2022: 12). The research population consists of academic personnel of the five major state universities in Iraq, Al-Mustansiriya university, University of Anbar, University of Baghdad, University of Basrah and University of Kufa. Such institutions were chosen due to the diversity of their geographical distribution, the diversity of institutions, and the different levels of the digital infrastructures. The sampling has the inclusion of several universities which increase the representativeness of the sample and makes the findings to be more generalizable to the entire higher education sector in Iraq.

An approach of stratified random sampling was employed to cater to proportional representation of faculties and academic ranks in the sampled universities. This stratification was required to accommodate possible variations in the TA perceptions by disciplines (e.g. humanities versus sciences), or by the academic-experience level (junior and senior staff). The sample frame was references in the official lists of the academic staff presented by the administration of each university. As calculated with Cochran formula, the required minimum number of samples was 384, given 95 percent confidence rate and a margin of error set to five percent (Taherdoost, 2018: 963). The sampling frame was identified as 500 questionnaires distributed basically through the internet and in-person as a protection measure against non-response and incomplete surveys. After data screening it was possible to retain 311 valid responses and analyze them, resulting in the usable response rate of 62.2%, which is more than the minimum suggested to use SEM application. This number of the final sample has ample statistical power to support the hypothesized model according to the PLS-SEM (Hair Jr et al., 2021: 12).

4.2 Data Collection Instrument

In order to make the findings valid and reliable, a structured questionnaire was used, and this was created through previously vested measurement scales. The questionnaire formed an outline for the evaluation of core constructs of the present study: TA (dependent variable), behavioral resistance (BR) and organizational readiness (OR) (independent variables), and communication quality (CQ) (mediating variable). The items were based on the existing literature, and few slight changes were made to align the items in context to the situation of Iraqi public universities. There were five major sections of the survey instrument. The first section captured demographic data such as gender, academic rank, years of experience, and faculty affiliation. The other four sections gauged latent variables of the study. TA was assessed using indicators of actual usage, compatibility, and trialability. Although a broader range of innovation attributes was initially proposed by Moore and Benbasat (1991: 200), the current study focused on these three dimensions as they are some of the most commonly used in recent research on technology adoption in higher education, especially studies that use the Diffusion of Innovation (DOI) framework (e.g., Al-Emran et al., 2020: 104; Dwivedi et al., 2023: 534). There was the inclusion of actual use to determine the behavioural consequence of technology adoption, in line with modern adoption models. The final TA scale however was composed of nine items; three items pertained for each dimension. A sample item is: “The system is compatible with the way I work.”

BR was measured across four dimensions cognitive resistance, emotional resistance, behavioral intentions, and perceived risks. Although the initial research of Kim & Kankanhalli (2009: 572) and

Klaus & Blanton (2010: 630) conceptualized the concept of resistance to technology in a broad manner without identifying a specific dimensional structure, the present study adopts an integrated measurement approach and were selected to capture the multifaceted nature of resistance (Oreg, 2003: 680; Castro, Zambaldi & Ponchio, 2020: 441; Abikari, 2024: 1036)0 The BR scale comprised of twelve items, with three items for each dimension. One of the sample items is: "I feel hesitant when I need to implement new technology." This approach will make the theoretical investigations consistent with the foundational work besides offering a practical and background phenomena-related measure of behavioral resistance in Iraqi public universities. OR was captured through three dimensions: leadership support, resource availability, and employee capability adapted from Chang Chang & Lin (2015: 451) and Dennison (2013: 45). Although there might have been other sub-dimensions or even slight variations of formulations in the original scales in these sources, the present study selected these three core dimensions to ensure conceptual clarity and relevance in terms of context of the Iraqi public universities. The OR scale contained nine items with three items under each dimension. One of the items is: "The University provides sufficient resources to support new technology initiatives." Such adaptation facilitates the fact that the measurement is true to the original conceptual framework and also is practically appropriate in the current research setting. For the mediating variable, CQ was measured through feedback mechanisms, transparency, and communication frequency, referencing scales from Men & Yue (2019: 102) and Mazzei (2014: 90). The CQ scale included twelve items, with four items for each dimension. A sample item is: "Information about technological changes is communicated clearly and openly."

All items were measured using a five-point Likert scale ranging from 1 "strongly disagree" to 5 "strongly agree". The questionnaire was first developed in English, then translated into Arabic using the back-translation method to ensure linguistic and conceptual equivalence (Brislin, 1970: 198). A pilot study involving 40 academic staff from two universities not included in the final sample was conducted to test the clarity, reliability, and cultural appropriateness of the instrument. Based on the feedback, minor adjustments were made to the wording of several items. Data collection was carried out over a four-month period using both online and paper-based formats, depending on each university's accessibility and preferences. The hybrid approach was adopted to enhance response rates and reach faculty members with limited internet access. Participation was entirely voluntary, and all ethical procedures were observed, including informed consent and data confidentiality. Out of the total responses that were received, 311 satisfactory ones were valid and were therefore used in the analysis meeting the required criteria of the PLS-SEM subsequent analysis. To handle the issues of non-response bias, a method of early-late responses was used as Armstrong and Overton (1977) suggested. Analyses of independent sample t-tests of differences between the first and last 25 percent of respondents based on important constructs did not produce any significant ($p < 0.05$) differences. Such findings mean that non-response bias could not have interfered with the validity of the results.

4.3 Data Analysis Techniques

The collected data were examined through the multi-step examination based on the best practice in structural equation modeling (SEM). However, with the aim of the study, it is necessary to analyze direct and indirect links between latent variables including the mediating role of CQ. Partial Least Squares Structural Equation Modeling (PLS-SEM) was employed as the primary analytical technique. The method is especially appropriate when models are complex; contain several constructs and mediating paths, or when a study is conducted in new environments where the variability of the data might not be able to support the parametric variables (Hair Jr et al., 2021: 14).

This analysis was done with Smart PLS 4.0 which is a popular software tool applied in variance-based SEM. The process was based on two steps: (1) assessment of the measurement model to check the reliability and validity of constructs and (2) evaluation of the structural model to test the hypothesized associations. Internal consistency was considered to warrant the reliability of the constructs, presented by Cronbach alpha and composite reliability (CR) ratios, which are both above the needed level of 0.70 (Fornell & Larcker, 1981: 43). Convergent validity was ascertained through analysis of factor loadings and average variance extracted (AVE), all factor loadings were identified to be greater than 0.60, whereas, the AVE values were greater than 0.50. To determine discriminant validity, both Fornell-Larcker criterion and Heterotrait-Monotrait ratio (HTMT) was used, which verified that every domain in the construct was unique to each other (Henseler et al., 2015: 120).
After having obtained the validation of the measurement model, the structural model was examined to verify the direct and mediating impacts presented within the research framework. The significance of relationships was calculated through the bootstrapping process with 5.000 resamples to obtain Path coefficients (β), t-values, and p-values. Moreover, the results were also the effect sizes (f^2) and predictive relevance (Q^2) reported to determine the practical significance of the results. The collinearity diagnostics (VIF values) were tested and the values were lower than 3.3, and thus the value does not indicate any multicollinearity problems (Hair Jr et al., 2021: 12). Besides, there was also the indirect effect analysis with bootstrapping of confidence intervals of the mediating role of CQ. Presence of a large indirect effect, coupled with a low or insignificant direct effect was also taken to reflect mediation (Zhao et al., 2010: 201). The overall predictive ability of the model was quantified based on R^2 statistics that provide the amount of variance, explained in the dependent variable (TA). The magnitude of 0.25, 0.50, and 0.75 were accepted as weak, moderate, and substantial, respectively (Hair Jr et al., 2021: 14). The model showed satisfactory scores of predictive precisions in a way that justified the proposed theoretical structure of the study.

5. Empirical Results and Analysis

5.1 Reliability and validity of the measurement model

Internal consistency reliability and convergent validity were analyzed in accordance with the guidelines suggested by Hair Jr et al. (2021: 12). Table 1 shows the standardized factor loadings, Average Variance Extracted (AVE), Composite Reliability (CR), and Cronbach's alpha (α). The items loading is greater than or equal to recommended level of 0.70 (Hair Jr et al., 2021: 12). The CR values ranged from 0.86 to 0.90, and Cronbach's alpha values exceeded 0.70, confirming satisfactory internal consistency. Furthermore, all AVE values were above the 0.50 benchmark, establishing convergent validity.

Table (1) Reliability and Convergent Validity

Construct	Dimensions	Items	Loadings	AVE	CR	CB alpha
Behavioral resistance (BR)	Cognitive resistance	4	0.71-0.83	0.61	0.88	0.84
	Emotional resistance	3	0.73-0.85	0.65	0.87	0.81
	behavioral intention	3	0.70-0.82	0.60	0.86	0.80
	Perceived risk	4	0.72-0.84	0.63	0.89	0.83

Organizational readiness (OR)	leadership support	3	0.74-0.88	0.66	0.90	0.85
	Resource availability	3	0.75-0.86	0.64	0.89	0.84
	Employee capability	3	0.72-0.85	0.62	0.88	0.82
Communication quality (CQ)	Feedback mechanisms	3	0.76-0.88	0.67	0.90	0.85
	Transparency	3	0.75-0.86	0.65	0.89	0.84
	Frequency	3	0.72-0.83	0.61	0.87	0.81
Technology adoption (TA)	Actual usage	3	0.74-0.86	0.64	0.89	0.84
	Compatibility	3	0.73-0.85	0.62	0.88	0.82
	Trialability	3	0.71-0.83	0.60	0.86	0.80

Source: (Prepared by the Researcher Based on the Analysis Results)

5.2 Discriminant Validity

Discriminant validity was examined using the Fornell–Larcker criterion and the Heterotrait–Monotrait ratio (HTMT), following Henseler et al. (2015: 120). Regarding Fornell–Larcker Criterion, Table 2 shows that the square roots of the AVEs (diagonal values) were greater than the correlations among constructs, confirming discriminant validity. Where, HTMT Ratio, Table 3 demonstrates that all HTMT values were below the conservative threshold of 0.85, further supporting discriminant validity.

Table (2) Fornell-Larcker criteria

Construct	RB	OR	CQ	TA
BR	0.78			
OR	-0.41	0.81		
CQ	-0.46	0.52	0.82	
TA	-0.49	0.55	0.58	0.80

Source: (Prepared by the Researcher Based on the Analysis Results)

Table (3) HTMT ratios

Construct	RB	OR	CQ	TA
BR	-			
OR	0.44	-		
CQ	0.48	0.56	-	
TA	0.52	0.60	0.63	-

Source: (Prepared by the Researcher Based on the Analysis Results)

5.3 Collinearity Assessment and Predictive Power

Collinearity was assessed through Variance Inflation Factor (VIF) values. All VIF values were well below the threshold of 5, indicating no multicollinearity issues (Hair Jr et al., 2021: 12). The model exhibited moderate to substantial predictive power, with R^2 values of 0.47 for CQ and 0.55 for TA. The blindfolding procedure confirmed predictive relevance, as Q^2 values exceeded zero.

Table (4) Collineatyity (VIF), Coefficient of Determination (R^2), and Predictive Relevance (Q^2)

Endogenous construct	Predictor	VIF	R^2	Q^2	Predictive relevance
CQ	BR	1.74	0.47	0.28	Yes
	OR	1.86			
TA	BR	1.92	0.55	0.31	Yes
	OR	2.04			
	CQ	2.11			

Source: (Prepared by the Researcher Based on the Analysis Results)

5.4 Hypotheses testing

The structural model was evaluated using the bootstrapping procedure (5,000 resamples). Table 5 summarizes the path coefficients, effect sizes, and significance levels. All hypotheses were supported except for H7, which posited that the indirect effect of BR on TA through CQ was not significant. Effect size (f^2) analysis indicated predominantly medium effects, with OR exerting the strongest influence on CQ ($f^2 = 0.24$), followed by CQ on TA ($f^2 = 0.21$) and OR on TA ($f^2 = 0.19$). BR showed a medium effect on CQ ($f^2 = 0.16$) and a small-to-medium effect on TA ($f^2 = 0.14$). The mediating effect of CQ on the OR → TA relationship was small ($f^2 = 0.06$), whereas its mediating effect on the BR → TA relationship was negligible ($f^2 = 0.01$).

Table (5) Path Coefficients and Effect Size

Hypothesis	Relationship	β -value	t-value	p-value	f^2	Effect Size	Results
H1	BR → TA	-0.31	5.62	< 0.001	0.14	Medium	Supported
H2	OR → TA	0.36	7.04	< 0.001	0.19	Medium	Supported
H3	BR → CQ	-0.33	6.18	< 0.001	0.16	Medium	Supported
H4	OR → CQ	0.42	8.12	< 0.001	0.24	Medium	Supported
H5	CQ → TA	0.39	7.85	< 0.001	0.21	Medium	Supported
H6	OR → CQ → TA	0.17	3.46	< 0.001	0.06	Small	Supported
H7	BR → CQ → TA	-0.05	1.21	< 0.226	0.01	None	Not Supported

Source: (Prepared by the Researcher Based on the Analysis Results)

6. Discussion

This study examined the drivers and barriers to technology adoption (TA) in Iraqi public universities by investigating the roles of Behavioral Resistance (BR), Organizational Readiness (OR), and Communication Quality (CQ). The findings provide both theoretical and practical insights into the mechanisms through which organizational and behavioral factors shape TA in higher education institutions.

6.1 Behavioral Resistance and Technology Adoption

The results confirmed that BR has a negative influence on TA (H1 supported) which is aligned with the Theory of Planned Behavior (TPB), that proposes the role of negative attitudes, subjective norms, and perceived behavioral control the apply of change resistances (Ajzen, 1991: 205). Increased cognitive resistance, emotional resistance, behavioral intention and perceived risks decreased the intention among lecturers to incorporate the new technologies into their instructions. Equal results can be described by literatures in other higher educational settings where the resistance is based on fear of workload escalation or not knowing the usefulness of any technology (Dwivedi et al., 2023: 529). Also, the significant negative impact of BR on CQ (H3 supported) indicates that the resistant people will rarely be keen to participate in transparent and constructive

communication about change initiatives. This result is consistent with the Change Communication Theory, which asserts that resistance erodes free conversations and feedback procedures, thus weakening the sense-making of change in the organization (Sakaguchi-Tang, 2012: 49).

6.2 Organizational Readiness and Technology Adoption

As revealed in this study, there is a positive effect of OR on TA (H2 supported), hence agreeing with the Technology-Organization-Environment (TOE) model, according to which organizational resources and leadership support are decisive factors in technological innovation (Tomatzky & Fleischer, 1990: 37). Public universities in Iraq that had more leadership commitment, resources and staff capacity were in a better position to promote TA. This further supports the notion that adoption is not purely an individual businesses issue since it would largely depend on the organizational framework and readiness. Also, OR positively affected CQ (H4 supported), which confirm that well change initiatives maintained an open, transparent and frequent communication. Leaders who can offer enough resources and demonstrate commitment are more prone to establish the atmosphere of trust and the sharing of information (Men & Yue, 2019: 102).

6.3 Mediating Role of Communication Quality

The results obtained in this study supported the positive impact of CQ on TA (H5 met) and are in line with Change Communication Theory that underlines the importance of clear, open, and inclusive communication as a factor that leads to the greater acceptance of change (Sakaguchi-Tang, 2012: 49). The lecturers who have better sense of clear and consistent communication were more permissive to new technologies. The paper has also determined that CQ mediates the positive impact of OR on TA (H6 supported). This interaction effect suggests that communication acts as a catalyst, translating OR into actual adoption behavior. This study extends the TOE framework since it empirically illustrates the role of communication, as a mediating mechanism, between organizational resources and TA outcomes (Dwivedi et al., 2020: 103). Interestingly, CQ was not significant mediator in the negative impact of BR on TA (H7 not supported). The given fact denotes that even the quality of communications can fail to directly break through deeply grounded psychological and emotional obstruction to change. It is possible that such resistance demands a greater need than informational clarity as it might be necessary to have behavioural interventions and attitude change strategies, such as change-oriented leadership and participatory decision-making (Ye et al., 2022: 7).

6.4 Theoretical Implications

This research makes several contributions to theory:

1. Integration of TOE and TPB: By simultaneously examining organizational and behavioral determinants, this study provides an integrated perspective on TA. TOE explains the structural and resource-related enablers, while TPB elucidates how individual attitudes and resistance shape adoption behavior.
2. Extension of Change Communication Theory: The findings demonstrate that CQ mediates the OR–TA relationship, but its buffering effect on BR was not significant. This suggests that while communication enhances organizational enablers, it may not directly override entrenched psychological barriers, indicating a boundary condition for Change Communication Theory, and opening avenues for exploring other mediators such as organizational culture, leadership style, or psychological empowerment.
3. Contextual Contribution: By focusing on Iraqi public universities, this study contributes to the limited literature on TA in developing-country higher education, where infrastructural and cultural constraints differ significantly from Western contexts.

6.5 Practical Implications

For university leaders and policymakers:

1. Address BR: Interventions should focus on reducing fear and perceived risks through training, peer support, and participatory decision-making, rather than relying solely on communication campaigns.
2. Strengthen OR: Leadership support, resource allocation, and skill development must be prioritized to create a fertile ground for TA.
3. Enhance CQ: Transparent, frequent, and feedback-driven communication is essential, particularly in reinforcing the positive effects of OR on adoption. Leaders should establish formal feedback loops and encourage two-way communication with academic staff.

7. Conclusions and Limitations

This study described the drivers and barriers of technology adoption (TA) in Iraqi public universities with respect to behavioral resistance (BR) and organizational readiness (OR) and the mediating effects of communication quality (CQ). The results offer multiple theoretical and practical supplements as to how universities reinforce TA initiatives. By confirming the negative impact of BR on TA, it was proved that cognitive resistance, emotional resistance, behavioral intentions, and perceived risks are the factors that inhibit the actual use, compatibility, and trialability of new technologies. Conversely, OR has a positive impact on TA, and it is noteworthy that leadership support, resource availability, and employee capability should be seen as an essential factor in promoting a favorable environment where technological innovations can be adopted (Saadi et al., 2023: 23). Additionally, BR has a negative impact on CQ, indicating that resistant employees show less interest in transparent communication and processes of sharing feedback, which in turn are critical in establishing confidence in embracing new technologies. On the other hand, there is a positive relationship between OR and CQ, demonstrating that prepared institutions promote open conversations, disclosure, and a high level of contact, thus favoring TA. Furthermore, the study confirmed that CQ significantly improves TA by enhancing employees' confidence and willingness to use, experiment with, and integrate new technologies. CQ also mediated the relationship between OR and TA, emphasizing that readiness alone is insufficient without effective communication mechanisms that provide clarity and reassurance during the adoption process. However, contrary to expectations, CQ did not significantly weaken the negative effect of BR on TA, suggesting that additional interventions such as change management initiatives, employee involvement in decision-making, and psychological support programs are required to address resistance effectively.

However, this study is not without limitations. The cross-sectional design restricts causal interpretation, and the findings are specific to public universities in Iraq, which may limit generalizability to other sectors or countries. Additionally, reliance on self-reported data introduces the possibility of response bias despite assurances of confidentiality. Future studies should adopt longitudinal or mixed-method designs to examine how resistance and readiness evolve over different stages of TA. Comparative research across public and private universities or across different cultural contexts is recommended. Moreover, exploring additional mediators such as organizational culture, leadership style, or employee engagement could provide deeper insights into overcoming BR and sustaining TA.

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