

**دور المرونة الاستراتيجية في تعزيز الابتكار التعليمي: الدور
الوسيط للكفاءة الرقمية في الجامعات العراقية**

م.د. عماد عدنان فاضل العاني
كلية الإدارة والاقتصاد – الجامعة العراقية

The Role of Strategic Agility in Enhancing
Educational Innovation: The Mediating Role of
Digital Competence in Iraqi Universities

دور المرونة الاستراتيجية في تعزيز الابتكار التعليمي: الدور الوسيط
للكفاءة الرقمية في الجامعات العراقية

Teacher Dr. Emad Adnan Fadhil Alani*

College of Administration and Economics – Iraqi
University

م.د. عماد عدنان فاضل العاني*

كلية الإدارة والاقتصاد – الجامعة العراقية

تاريخ النشر: 2026/09/01

Received: 21/03/2025

تاريخ القبول: 2026/08/25

Accepted: 25/08/2026

تاريخ الاستلام: 2025/03/21

Published: 01/09/2026

المستخلص:

تهدف هذه الدراسة إلى بحث أثر المرونة الاستراتيجية على الابتكار التعليمي في الجامعات العراقية، وما إذا كانت الكفاءة الرقمية تُعدّ وسيطاً في هذه العلاقة. تُعرّف المرونة الاستراتيجية بأنها بناء ثلاثي الأبعاد: الحساسية الاستراتيجية، والالتزام الجماعي، وسيولة الموارد، وذلك استناداً إلى إطار تصنيف المرونة الاستراتيجية، بينما تُعتبر الكفاءة الرقمية وسيطاً، والابتكار التعليمي نتيجةً له. جمعت بيانات الدراسة عبر استبيان (248 إستبانة صالحة للقياس) من أعضاء الهيئة التدريسية وقادة المؤسسات في ثلاث جامعات حكومية بارزة (بغداد، والبصرة، والموصل). أُجري تحليل البيانات باستخدام برنامج SmartPLS. وأظهرت النتائج أن المرونة الاستراتيجية تعزز بشكل ملموس كلاً من الابتكار التعليمي والكفاءة الرقمية، حيث برزت "سيولة الموارد" كأقوى الأبعاد تأثيراً. كما أثبتت النتائج وجود دور وسيط جزئي ومتبادل للكفاءة الرقمية في العلاقة بين المرونة الاستراتيجية والابتكار التعليمي، مما يشير إلى أن جزءاً كبيراً من تأثير المرونة الاستراتيجية يتحقق من خلال رأس المال البشري المؤهل والمدعوم بمقومات الرشاقة. تُطبق هذه الدراسة إطاراً غريباً في الغالب على سياق القطاع العام غير المستقر والمحدود الموارد، وتُقدم إسهاماً معرفياً ذا صلة بالسياق من خلال تحديد قدرة التنفيذ، وليس الاستجابة البيئية، باعتبارها العامل الأكثر تأثيراً على الابتكار في أنظمة التعليم العالي الأكثر مركزية. تُعدّ آثار هذه النتائج قابلة للتطبيق، إذ تشير إلى أن تقليل مركزية الموارد، إلى جانب الكفاءة الرقمية لدى الموظفين، يُمكن أن يسهم في تحويل التوجهات الاستراتيجية المبرنة إلى إعادة هيكلة مستدامة داخل الجامعات العراقية.

الكلمات المفتاحية: المرونة الاستراتيجية، الكفاءة الرقمية، الابتكار التعليمي، سيولة الموارد، والتعليم العالي العراقي

Abstract:

The study aims to investigate the impact of strategic agility on educational innovation in Iraqi universities and whether digital competence mediates this relationship. Strategic agility is conceptualized as a three-dimensional construct: strategic sensitivity, Collective Obligation, and resource fluidity, grounded in the framework of the strategic agility taxonomy, while digital competence is positioned as a mediator and educational innovation as an outcome. The data for the study were collected via a questionnaire (in a structured form) from academic staff and institutional leaders at three prominent public universities (Baghdad, Basrah, and Mosul), which resulted in 248 valid responses. The analysis of the data was performed using Partial Least Squares Structural Equation Modeling (PLS–SEM) through SmartPLS 4. The results find that strategic agility strengthens educational innovation and digital competence, with the

strongest influence from resource fluidity. The results proved that digital competence partially and mutually mediated the effect of strategic agility on educational innovation, suggesting that a significant portion of the influence of strategic agility is passed through the certified human capital endowed by agility. This study transfers a mostly Western framework into an unstable, resource-limited public-sector context and makes a context-relevant contribution by identifying implementation capacity, not environmental responsiveness, as the most dominant influence on innovation in more Centralised higher-education systems. The implications of these findings are actionable, suggesting that less centralization of resources coupled with digital competence among staff can help convert agile intentions into sustainable reconfiguration within Iraqi universities.

Keywords: strategic agility, digital competence, educational innovation, resource fluidity, PLS-SEM, Iraqi higher education

Introduction

Universities today have a lot more pressure than they used to; changing expectations of learners, cascading technology change, and rising global competition are making running a university a different beast (Hanna, 2019; Fernández et al., 2023). The truth is that digital transformation has really become a strategic initiative and not an option, one made even clearer by COVID-19, during which universities were effectively closed down overnight and forced to go online (Ahmed, 2025; Watermeyer et al., 2020). But the industry has staggered in its response, holding fast to its ironclad, antiquated teaching model even as the digital age demands fluidity (Abad-Segura et al., 2020). In the context of strategic management, this is how well an organization can maneuver under such turbulence, and it relates directly to strategic agility (Walter, 2020; AlTaweel & Al-Hawary, 2021).

Strategic agility is located within the dynamic-capabilities tradition, which has defined it as the firm's ability to integrate, build, and reconfigure competences in response to rapidly changing environments (Alkandi & Helmi, 2024; Teece et al., 2016). The most complete construction of it is from Doz and Kosonen, who base the idea on three dimensions: strategic sensitivity (heightened sense of changes in emerging contexts), collective obligation (the leadership group's ability to make decisive choices unitedly and quickly), and resource fluidity (asset deployability) (Yıldız & Aykanat, 2021). This triad has enjoyed widespread scholarly consensus (Diego et al., 2022; Sahasranamam & Soundararajan, 2021; Reed, 2021). In accord with the source utilized here, throughout this text, the second dimension elucidated elsewhere as leadership unity (or collective commitment) is designated as collective obligation (Yıldız & Aykanat, 2021). It transfers easily to universities, whose leaders must similarly sense change, seize opportunities, and reinvent their schools (Teece, 2017).

The link between agility and innovation is well established across sectors (Yıldız & Aykanat, 2021; Clauß et al., 2019; Alghamdi & Agag, 2023; Troise et al., 2021), and it has now been tested inside universities in Jordan (Shaban, 2024), Egypt (سالم, 2025 & هلال), Malaysia (Chan & Muthuveloo, 2019), and India (Chahal & Gupta, 2024), with leadership repeatedly emerging as the crucial enabler (Menon & Suresh, 2020). The outcome this study explains, educational innovation, is a defined construct: a purposeful change, pedagogical, methodological, or technological, that adds value and demonstrably improves teaching and learning (1971- & Laura, 2024; Vidicki et al., 2022; Ellis et al., 2022; Mykhailyshyn et al., 2018).

If agility supplies the organizational conditions for innovation, digital competence supplies the individual capability through which those conditions reach the classroom: the creative, critical, and safe use of technology in academic practice (Aiastrui et al., 2021; Santos et al., 2023; Gómez-Pablos et al., 2022). Importantly, institutional digital transformation is at a different level of analysis than individual digital competence (Fernández et al., 2023; Santos et al., 2023), and it turns out the empirical link between them exists: leadership and organizational support impact teaching innovation through digital competence (Li & Pek, 2026; Li et al., 2025; Rasyid, 2026).

The mediation logic is particularly revealing in Iraq, where it identifies an implementation gap that refuses to put down roots. Iraqi higher education has long faced sparse ICT infrastructure, low bandwidth, limited budgets, e-learning illiteracy, weak technical support, and instability rooted in conflict (Al-Azawei, 2019; Al-Azawei et al., 2016, 2017; Serin, 2022; Ameen et al., 2018). Despite growing access to technology, universities have not converted it into better teaching or learning outcomes (Fadahl et al., 2026); the "digital paradox" is that infrastructure fails to reach the classroom (Li & Pek, 2026). Iraqi institutions have begun to respond (Mohammed et al., 2026; Abdul-Jabbar & Alkilabi, 2025), and it is precisely at the intersection of infrastructural constraint and organizational agility that faculty digital competence emerges as the decisive mediating mechanism (Al-Azawei et al., 2017; Fadahl et al., 2026; AlTaweel & Al-Hawary, 2021; Yıldız & Aykanat, 2021; Li & Pek, 2026; Li et al., 2025; Rasyid, 2026).

Despite this accumulated knowledge, decisive gaps remain. The integration of digital capabilities into agility frameworks is still incomplete (Mueller-Saegebrecht & Walter, 2025); the construct itself has not reached maturity (Diego & Almodóvar, 2021); higher-education studies examine agility's factors in isolation rather than in interplay (Rathi et al., 2025); and reviews confirm open questions about how IT capabilities shape innovation-driven outcomes (Hariyanto et al., 2025). No study has yet operationalized the three-dimensional agility model against educational innovation with faculty digital competence as the mediator, and none exists for Iraq, where conditions make the question most consequential (Shaban, 2024; Mohammed et al., 2026). Accordingly, this study asks: What is the role of strategic sensitivity, collective obligation, and resource fluidity in enhancing educational innovation in Iraqi universities, and to what extent does digital competence mediate that relationship? Anchored in dynamic-capabilities theory (Alkandi & Helmi, 2024) and the higher-education digital-competence literature (Gómez-Pablos et al., 2022), it models the three agility dimensions as upstream enablers, digital competence as the proximal mediator, and educational innovation as the outcome (Li & Pek, 2026; Li et al., 2025; Yıldız & Aykanat, 2021) extending a corporate framework to Iraqi higher education and specifying the mechanism through which agility becomes pedagogical practice (Hariyanto et al., 2025; Mueller-Saegebrecht & Walter, 2025).

Literature Review**Independent Variable: Strategic Agility**

Strategic agility is not a new idea; it dates back roughly two decades, but it has gained fresh relevance as organizations have had to confront the financial crisis and the wave of economic, technological, and socio-political uncertainty that followed (Pereira et al., 2018; Reed, 2021). A rough consensus has settled around Weber and Tarba's definition: management's ability to sense change quickly, respond through deliberate strategic action, and reorganize so that action can be carried out (Reed, 2021). A great qualification is added to the notion that agility is not simply fast response but fast response bound in strategic purpose by Vecchiato (Reed, 2021). Marlapa et al. (2024) take this further and limit it to higher education, defining it as an institution's ability to recognize possible threats and opportunities and respond appropriately. When textual variations are removed, these accounts cohere in a three-part logic: sensing, redirecting, and implementing (Clauß et al., 2019); this will be used as the working definition for this study.

At the broader level, strategic agility descends from the dynamic capabilities tradition: Doz and Kosonen elaborated Naasat's work with respect to a firm simply having a generic potential (a capacity, even) to integrate, build, and reconfigure competencies in the face of rapid change (Alkandi & Helmi, 2024); whereas Teece, Peteraf & Leih later articulated this capability as paramount for firms to deal with deep uncertainty from innovation and competition (Teece et al., 2016). The first distinction relates to the use of organizational agility, which is often treated as a synonym but can be seen more accurately as a subset of dynamic capability focused on sensing and responding (Walter, 2020); and the second entails that while dynamic capabilities are generally reactive, strategic agility is intended to preemptively renew the organization (Clauß et al., 2019).

This concern is understandable, and the environment justifying that view is simply unstable. ALTaweel and Al-Hawary (2021) see turbulence as an existential corporate challenge, complemented by Troise et al. (2021), who argue survival in a VUCA world is based on either anticipating or responding with agility to disruption. COVID-19 provided a distinct test case, achieving high scores on nearly every dimension of turbulence at once (Reed et al., 2022). During this period, agility and innovation capacity were identified as core to SME survival (Rahman et al., 2022); dynamic capabilities were associated with customer and operational agility as the main elements for crisis preparedness (Idrissi et al., 2022), while similar conclusions were drawn on organizational survival (Rasmussen et al., 2022). Organizations seldom fall after one failure; they simply repeat old successes until found in an irretrievable model (Yıldız & Aykanat, 2021).

Strategic agility is a concept that has garnered significant attention in the past decades, with a broad consensus in the literature on three main capabilities underpinning it (Clauß et al., 2019). So, strategic sensitivity, the combination of anticipatory alertness and an open strategy process (Reed, 2021; Clauß et al., 2019), comes first; it relies upon the quality of interaction among senior leaders (Sahasranamam & Soundararajan, 2021), and is a necessary condition for everything else (AlTaweel & Al-Hawary, 2021). Collective obligation, initially coined as "leadership unity (Doz & Kosonen, 2008), conveys interdependence and integrative leadership (Reed, 2021) or a lack of internal politics based on a collaborative decision process (Diego et al., 2024); for consistency, we use the term collective obligation throughout this paper. Resource fluidity involves resource release as soon as the direction of movement is determined (Doz & Kosonen, 2008), relates to strategy-structure coupling (Reed, 2021), refers to allocation in pace with strategy (Diego et al., 2022), and enables mechanisms such as flexible structures and decentralized decision-making (Sahasranamam & Soundararajan, 2021). The construct is treated as second-order here because they need to simultaneously exist (Reed, 2021).

Empirically, the picture is mixed. The key drivers of agility are leadership orientation, dynamic capabilities, learning, and innovation (Singh & Sheoran, 2025); while in the context of higher education, environmental scanning, marketing and learning were significant among Malaysian universities (Chan & Muthuveloo, 2020), and later a companion study identified technology, capability and people as antecedents to agility in the context of higher education (Chan & Muthuveloo, 2019). Agility has been positively aligned with performance and innovation (Yıldız & Aykanat, 2021; AlTaweel & Al-Hawary, 2021), but no direct effect exists in the Saudi industrial sector (Alkandi & Helmi, 2024) or for Indonesia's motorcycle industry (Purwanto et al., 2023), indicating that the influences of agility are often indirect, which favors a mediated design like this study.

In higher education specifically: sensitivity, response, and fluidity have been associated with organizational excellence in Jordan (Shaban, 2024); agility has affected performance conducted through technological and knowledge capabilities in India (Chahal & Gupta, 2024). Agility has similarly been characterized as all but necessary for high performance (Chan & Muthuveloo, 2019). As for the measurement, we validated a second-order instrument rooted in sensitivity, collective obligation, and fluidity of resources (Rathi et al., 2025); this framework is directly adopted here.

Gaps remain notable. Digital capabilities are not very well integrated within agility frameworks (Mueller-Saegebrecht & Walter, 2025), and the field has even been referred to as still in its infancy (Diego & Almodóvar, 2021). Rathi et al. (2025) call for frameworks mapping the interplay between factors, echoed by Hariyanto et al. (2025), whose review finds gaps around IT's role in innovation outcomes. These gaps carry weight in Iraq, where educational-technology infrastructure remains thin (Al-Azawei, 2019), constrained by low bandwidth, weak budgets, unclear planning, e-learning illiteracy, and inadequate training (Al-Azawei et al., 2017). It is against this backdrop that the present study examines strategic agility through sensitivity, collective obligation, and resource fluidity as a driver of educational innovation in Iraqi universities, with digital competence proposed as the mediating mechanism.

The dependent variable is Educational Innovation.

Educational innovation is a term used constantly and defined rarely, or at least defined consistently. Scholars surveying the field's many attempts at a definition have concluded, somewhat wearily, that the sheer variety of formulations has left the concept without clear or authoritative meaning, a problem especially pronounced in higher-education research, where the word is often deployed loosely (Cai, 2017). That said, most working definitions meet on common ground once the jargon is set aside. Educational innovations are defined as goal-directed activities or organizational arrangements, systems, or methods that differ fundamentally from established practice and involve multiple aspects of innovation at the institutional level for the first time in order to make it more functional and competitive (Mykhailishyn et al., 2018). Another take on the same idea has approached it as a dynamic process instead of a static category: an idea followed by implementation, then outcome, with the consideration that in order for an innovation to yield transformative effects, it needs to be rapidly diffused and adopted at scale rather than remain a local curiosity (Serdyukov, 2017). A third reading, one heavily influenced by the OECD, explicitly links the definition to outcomes, framing educational innovation as dynamic change that adds value to pedagogical or organizational processes and results in enhanced learning outcomes, stakeholder satisfaction, or both; only those changes resulting in demonstrable gains qualify as innovations as opposed to mere change (1971 - & Laura, 2024). Innovation is often categorized into three areas: a) Pedagogical innovation, including change in teaching style and ways to organize instruction; b) Scientific & methodological innovation, updated program content, new courses and modern teaching materials; c) Educational-technological innovation, new or improved learning technologies such as distance learning practices, e-libraries or university information systems (Mykhailishyn et al., 2018). It is all a question of preferred typology, but the distinction between innovation and improvement is one that needs to be retained in that it relates to uniqueness, originality, and extent of resulting change (Serdyukov, 2017).

The argument for why universities should in fact innovate is well rehearsed. Competition has become almost a defining characteristic of higher education, restructuring institutional strategy and academic life (Hart & Rodgers, 2023), and while it can spur innovation and creativity in any institution or community, if taken too far, an environment defined by competition can stifle the very creativity it was intended to stimulate (Hart & Rodgers, 2023). However, the evidence on barriers is less positive: research on pedagogical innovation has shown that teachers find it difficult to shift towards student-centered practice, and face heavy time burdens in preparing innovative lessons; they meet difficulties in large classes; shortages of materials, equipment and qualified staff remain a problem (Sandra et al., 2023). A successful innovation cannot simply be handed down or imported; it must develop an ethos of committed leadership and academic staff willing to act innovatively (Smith, 2011).

These general problems are sharpened by the Iraqi case. The state promoted free compulsory education and pledged to eradicate illiteracy, with Iraq winning a UNESCO award for that in 1982; it boasted one of the best higher education systems in the Arab world (Jawad & Al-Assaf, 2014). That position did not endure what later befell: the wars of 1980–1988 and 1991, the 2003 invasion, and the sanctions regime of the 1990s all contributed to deep international isolation for Iraqi universities, forced much of the academic labor force into exile inside or outside the field, and left many permanent structural deficits (Jawad & Al-Assaf, 2014). The effects remain visible. The use of ICT has increased; this increase, however, has not led to improved teaching (in the ranking for higher education, Iraq has recently dropped steadily), and many obstacles related to traditional methods of teaching, the obsolescence of some educational institutions' infrastructures, and weak performance monitoring systems are evident (Fadahl et al., 2026). The case of e-learning adoption has been no exception, where some cultural, technological, and administrative barriers specific to the nature of Iraqi public universities made its implementation difficult (Al-Azawei et al., 2016). That does not mean

that there is no room for innovation in Iraqi universities, however. Based on a sample of 439 headmasters and 10 academic leaders from public and private institutions, innovation can be reliably assessed in this context and responds to various identifiable organizational enablers, with transformational leadership emerging as the most relevant (Al-Husseini & Elbeltagi, 2014).

However, what has not yet been attempted in the body of existing literature is to weave these threads into a narrative feeding back into a single explanatory account of whether indeed currently-discussed capabilities such as strategic agility are propelling educational innovation and, if so, by what mechanism that influence flows. This is the question addressed by the current study, which assumes educational innovation as a dependent variable to be explained, agility as an independent antecedent to educational innovation, and digital competence as a corresponding mediating channel of herding processes through which the effects of agility are actively processed.

By far the most prevalent concept of digital competence in higher-education scholarship comes from the European Commission framework DigComp, first put forward by Ferrari (2013) and elaborated upon more or less continuously ever since. The most developed and extensive form for the teaching profession, DigCompEdu, describes the competence an educator needs in a structured manner through six facets, based on professional engagement; digital resources; teaching and assessment; and learning with technology (Horváth et al., 2024). Building upon this work, Tondeur et al. adapted the construct to universities with a four-dimensional model in the HeDiCom framework 2 components of teaching practice empower students for a digital society, and teachers' own digital literacy supports professional development (Tondeur et al., 2023). One of the many things that distinguish these frameworks is a reluctance to regard digital competence as primarily a technical challenge. In academic contexts, this construct goes far beyond the instrumental utilization of ICT tools in use but incorporates more systematic elements of evaluation, collaboration and feedback as habitual skills and pedagogical practice competences closer to a disposition than a checklist (Santos et al., 2023).

It is no longer really disputable that this matters for universities, and empirical work has recently begun to put numbers behind the intuition. More critically, in a study of Omani universities, digital transformation strategy alone accounted for nearly 75 percent of the variance in faculty performance (Ahmed, 2025); when digital transformation was entered as a mediating mechanism, that percentage climbed above 90, further evidence that faculty-level digital capability is the channel through which institutional strategy manifests itself in day-to-day teaching and research. Evidence for this point otherwise would have been conceived in some rather other way given the pandemic. In one of the most widely cited studies of UK academics, Watermeyer and colleagues documented this considerable disruption through a rapid survey undertaken in light of the emergency shift to online teaching after the closure of universities, although rather questionable numbers on sample size are sometimes attributed to this study in secondary citations (Watermeyer et al., 2020). However, where digital competence is weak, the effect works in the other direction, with weak faculty proficiency in online assessment and pedagogy noted as one of the more important barriers to a successful transition to e-learning (Turnbull et al., 2021).

Iraq provides these broad observations with some sharp focus. Internet penetration was only 1 percent of the population as late as 2009 and had grown to just 9 percent by the end of 2014 (Al-Azawei et al., 2016, 2017). A relatively thin base low bandwidth, budget constraints, vague strategy in place for e-learning, poor levels of familiarity with this new way of learning and delivery mode, weak motivation to learn or scepticism about the value of learning; inadequate acceptance and availability support from various sources such as technology; unstable security among others have emerged as barriers that build a fairly rough-hewn pyramid on top (Al-Azawei et al., 2017). In a more recent study, Fadahl and colleagues have demonstrated that while ICT access among Iraqi universities has increased, it

has not led to demonstrable improvements in teaching quality or student learning outcomes (Fadahl et al., 2026). Collectively, these findings imply that digital competence in Iraq should not be viewed simply as an individual disposition, but rather one for which institutional conditions enable or constrain its development and where, when they are weak, deficits of digital capability impede the adaptation of strategic intent into measures of educational reform. In this study, it is precisely this blocking-and-enabling function that is assumed of digital competence as mediator.

Development of hypotheses

Treating innovation as effectively what strategic agility looks like in practice feels like a case of quite good first principles reasoning. If agility means sensing change early, deciding boldly, and moving resources quickly, then innovation is likely its most natural expression. The assessment is inherent in the structure: Doz and Kosonen's three meta-skills, strategic sensitivity, leadership unity, and resource fluidity (Reed, 2021; Yıldız & Aykanat, 2021), align very closely with what introducing a new element into an institution requires. To innovate, you need to spot a new requirement emerging before it is obvious, leadership with enough confidence in an idea that they will double down on something untested rather than retreat back into the familiar, and sufficient organizational slack to divert people, budgets, and systems toward whichever of those ideas was selected. In theory, innovation should come more easily to an institution that has nurtured all three; whereas one that is lacking in those areas will most likely continue reproducing existing practice no matter external pressures for innovation.

An empirical record, typically based on the study of corporate settings rather than educational ones, suggests as much. Yıldız and Aykanat (2021) found strategic agility exerted strong positive effects on both firm performance ($\beta = .895$) and organizational innovation ($\beta = .854$), with innovation partially mediating the agility–performance relationship, a finding that already hints at the mediated structure this study builds on. AlTaweel and Al-Hawary (2021), surveying 224 senior managers, reached a broadly similar conclusion, reporting that agility significantly strengthens innovation capability and that much of agility's payoff surfaces there. Working with 432 German electronics firms, Clauß et al. (2019) showed that strategic agility predicts business-model innovation particularly under environmental turbulence, with that innovation again mediating agility's contribution to performance. Sahasranamam and Soundararajan (2021) describe a similar dynamic from a different angle, showing how agile ecosystems restructure knowledge and redeploy resources rapidly toward newly identified opportunities, and Ghezzi and Cavallo (2018) trace the same sensing-deciding-reconfiguring logic in start-ups that treat continuous innovation as a matter of survival rather than choice. The evidence base is less robust in higher education generally, but it is beamed in the same direction. Strategic sensitivity (four items), strategic response (six items), and resource fluidity (seven items) positively influenced organizational excellence in Jordanian universities (Shaban, 2024). A positive correlation between perceived agility and organizational innovativeness was also reported using an instrument developed and validated in university settings (Rathi et al., 2025). While close to a precondition for excellence (Chan & Muthuveloo, 2019), strategic agility has also been seen as an appropriate instrument of competitive advantage in private higher education (Rizki et al., 2023). The emerging body of literature connecting innovation agility to educational outcomes ultimately confirms that research on this topic is a bona fide growing stream, with little resolution existing over the lingering questions involving IT capabilities in that relationship (Hariyanto et al., 2025).

This literature has not tested the relationship where it arguably matters most: within Iraqi universities, which are working in conditions of resource scarcity, institutional instability, and infrastructure constraints that differ

dramatically from those in which agility theory was originally developed and tested. We cannot assume, merely on the basis of evidence from those very different kinds of jobs, that the logic above translates cleanly to that context: German manufacturers or Jordanian universities working under conditions entirely dissimilar from hers. This is an unresolved question that inspires the hypotheses outlined below, drawing on the conceptual and empirical case made in this paper so far.

H1: Strategic agility positively influences educational innovation in Iraqi universities.

H1a: Strategic sensitivity positively influences educational innovation in Iraqi universities.

H1b: Collective obligation positively influences educational innovation in Iraqi universities.

H1c: Resource fluidity positively influences educational innovation in Iraqi universities.

Before we get moving, let's pause on a distinction that is easy to conflate but is wildly important for what comes next: agility and digital competence are no two peas in the same pod. Strategic agility is rightly an institutional asset: the ability of an entity to sense change, direct execution with leadership, and allocate resources appropriately (Yıldız & Aykanat, 2021). In contrast, digital competence is (falsely) located in the lecturer redesigning a course for an unfamiliar platform, the administrator moving a paper-based process online within days of being told to do so, and the researcher who is suddenly expected to undertake fully-functional-within-a-year-it-will-be-easy data science with tools that didn't exist ten years ago (Gómez-Pablos et al., 2022; Tondeur et al., 2023). The way these two are connected is not that one can be swapped with another, but that one largely creates the conditions under which the other flourishes. The name of the institution that sees digital shifts earlier, and regards it as a game, not a technical housekeeping job, is generally the sort of institution that does training, builds infrastructure around them, and makes room for staff to experiment; these are exactly what foster individual digital competence in the first place (Kocot, 2024; Surjawan et al., 2025).

The same is suggested by firm-level research. The deployment of digital technologies has emerged as a major antecedent to organizational agility, which in turn produces performance and innovation outcomes (Troise et al., 2021), while a similar process has been described whereby digital transformation and competence augment agility, with strategic leadership conditionally enhancing that relation (Subariyanti et al., 2025). The ability of employees to enable agility, seen through dimensions such as training in digital competencies, technology investment, and support for a culture open to change, all move together; without one, the other improves little (Kocot, 2024). But it would be a mistake to think that the arrow of causation points in one direction only. Conceptually, digitalization and agility have been further elaborated as co-evolving processes rather than a sequence of cause and effect (Ciampi et al., 2021), whereas empirical evidence from emerging economies suggests that human digital competence leverage strategic agility via both direct effects as well as through organizational learning versus the reverse (Radhi, 2026).

The story told by higher-education research is relatively stable. This view considers aspects such as faculty digital competence and the technological infrastructure to be foundational enablers of an institution's digital maturity, enabling but also dependent on institutional strategy and leadership rather than independently developing this foundation (Llopis-Albert et al., 2026). The inverse is similarly true and draws out the same answer: Leadership Commitment and Resource Allocation are critical strategies for improving educator technical competencies (Surjawan et al., 2025). Nowhere is this pattern more starkly illustrated than in Iraq. Although there are some documented constraints in at least one location e-learning illiteracy, poor technical support and expertise, under-funding, and unstable infrastructure it will not be realistic to expect that digital competence could develop purely out of personal initiative (Al-Azawei et al., 2016; Fadahl et al., 2026; Younis et al., 2023). Faculty are unlikely to become digitally

capable by default in an environment offering little training and rewarding experimentation even less. If competence is to develop under these conditions, it will be because the institution senses the need, commits to addressing it, and redeploys what resources it has toward that end — in other words, because the institution is agile in the first place. The following hypotheses are therefore advanced:

H2: Strategic agility positively influences digital competence in Iraqi universities.

H2a: Strategic sensitivity positively influences digital competence in Iraqi universities.

H2b: Collective obligation positively influences digital competence in Iraqi universities.

H2c: Resource fluidity positively influences digital competence in Iraqi universities.

Innovation and digital competence get conflated fairly often in casual talk about "digital education," but they are not the same thing, and the difference matters for how this study is put together. Educational innovation is the outcome this study is ultimately interested in: new teaching designs, unfamiliar methodologies, different ways of drawing students into the material. Digital competence is what makes any of that actually possible. With little experience building an assessment around a virtual learning platform, a lecturer who has never properly used one simply cannot innovate with technology, and this is not so much reluctance as it is capacity; the ability just isn't there yet (Gómez-Pablos et al., 2022; Santos et al., 2023). This is really at the heart of the argument being made here: that asymmetry with competence functioning before innovation rather than simply alongside it.

This reading is supported by evidence rather directly. Argüello-Cedeño and Briones-Ramón (2025) found that digital competence predicted teaching creativity and innovation, and the finding is worth sitting with for a moment, because what seems to be doing the work is not mechanical familiarity with devices but the more relational and critical dimensions of competence the capacity to collaborate with colleagues, share practice openly, and exercise some judgment about what is actually worth adopting rather than adopting technology for its own sake. This pattern has been around longer than either of these two studies suggests. The systematic review conducted by Basilotta Gómez-Pablos et al. (2022) found that faculty digital competence, taken as a whole, tends to sit at only a moderate level, and that involvement in research and innovation projects is one of the few factors reliably associated with its growth over time (Guillén-Gámez & Mayorga-Fernández, 2020). Guillén-Gámez and Mayorga-Fernández's survey of 867 Spanish lecturers confirmed much the same predictor holding across the teaching, evaluation, and research dimensions of digital competence, and Espitia Barrero et al. (2025) add that ICT integration forms part of the innovative competence profile of university faculty more broadly, even though its formal evaluation and dissemination remain, by their account, still fairly underdeveloped.

It would be too simple, though, to read this relationship as running in only one direction. Innovation clearly builds competence as well: faculty who take part in innovative projects tend to come out the other side more digitally capable than they went in (Gómez-Pablos et al., 2022). But the direction that matters most for the purposes of this study runs from competence toward innovation, since that is the pathway along which strategic agility is expected to reach its ultimate outcome. Within higher education more generally, faculty digital competence and technological infrastructure function as the foundational layer beneath digital pedagogies without them in place, innovation efforts tend not to scale beyond isolated pockets of enthusiasm (Llopis-Albert et al., 2026; Surjawan et al., 2025) and academics who are digitally literate engage more productively with new platforms, which is largely how pedagogical innovation ends up happening in practice rather than remaining aspirational (Ahmed, 2025). If this is the general pattern elsewhere, Iraq brings it into rather sharp focus. Where e-learning illiteracy and inadequate training are already documented as persistent constraints (Al-Azawei et al., 2016; Fadahl et al., 2026), competence is in short supply, and so, by extension, is the innovation that depends on it. No amount of institutional intention or strategic ambition will produce

meaningful pedagogical change if the people expected to carry that change forward simply lack the capacity to do so. Accordingly, the following hypothesis is proposed.

H3: Digital competence positively influences educational innovation in Iraqi universities.

The argument developed so far has really unfolded in two stages. Agility, on one hand, creates the conditions under which digital competence has room to grow: the training budgets, the resource allocation, and the institutional seriousness that treats digital capability as strategic rather than incidental (Jiménez-Hidalgo et al., 2025). Competence, on the other hand, is what actually allows faculty to change what happens in their own classrooms (Argüello-Cedeño & Briones-Ramón, 2025; Santos et al., 2023). Once both of these are granted, a third claim follows almost naturally: part of agility's effect on innovation is unlikely to travel directly from one to the other. It is far more plausible that the effect passes through the very competence that agile institutions have deliberately cultivated. Put differently, the university that ends up innovating is rarely the one that simply declares itself innovative and stops there; it tends to be the one that has invested patiently in its people's digital capacity and then allowed that capacity to do the actual work of change.

The empirical record, though it has rarely tested this exact three-part chain within a single model, keeps circling back to the same underlying pattern. Chahal and Gupta (2024) found that technology capability and learning capability partially carried the effect of organizational agility on performance in Indian universities, with capability functioning as the channel through which agility's benefits are realized rather than something running alongside it. Anwar et al. (2026) report a closely related result from Pakistani higher education, where e-knowledge and organizational agility together mediated the path from digital leadership to organizational innovation. Similar findings turn up in firm-level research as well. Akkoca (2025) found that learning mediates the relationship between agility and innovation and, notably, that this indirect path grows stronger as digital maturity increases; weak digital capabilities, in other words, leave learning with comparatively little to work with. Jing et al. (2023) showed that organizational agility partially mediates the link between digital capability and innovation performance, while Du et al. (2023) found digital innovation mediating the effect of digital platform capability on innovation performance specifically within educational institutions. Two more recent studies round out the picture from either end of the chain: Fildansyah and Nailul (2025) demonstrated that knowledge sharing mediates the effect of digital competence on agility, with a learning-oriented culture driving innovation through that same knowledge-sharing mechanism in Indonesian firms, while Raina and Upadhyay (2025) add a useful note of caution digital competency by itself does not produce results without deliberate strategic direction behind it, a reminder that the competence sitting in the middle of this chain does not simply materialize on its own.

There are two qualifications that need to be stated explicitly, since the sequence I propose is not uncontested. The place of organizational learning in the causal chain is a contested issue, as it has been positioned between human digital competence (HDC) and agility (Radhi, 2023), while another perspective contends the three constructs are arguably better understood through referring to multidirectional instead of fixed causation (Adedoyin, 2024). However, within higher education itself, the approach taken in this research remains at least somewhat justifiable: digital competence among professors tends to require purpose and competence development as a basis for institutional agility instead of occurring spontaneously (Surjawan et al., 2025). Secondly, and probably more significantly, this chain has only very recently been investigated in educational contexts; until reviews held a flame to the role information-technology provisions play on innovation results as an open instead of settled question checker stub (Hariyanto et al., 2025). More critically, in a domain such as Iraq, where the data have shown that illiteracy to e-learning has knock-on effects, and insufficient technical support and even training are known constraints, the gap

assumes much graver significance rather than a thought experiment (Al-Azawei et al., 2016; Fadahl et al., 2026). In that setting, the question stops being purely theoretical: if agility's effect on innovation does in fact run through digital competence, then building that competence is not a peripheral concern or a side project sitting alongside the real work of institutional reform; it is the mechanism itself. Accordingly, the following hypothesis is proposed.

H4: Digital competence mediates the relationship between strategic agility and educational innovation in Iraqi universities.

H4a: Digital competence mediates the relationship between strategic sensitivity and educational innovation in Iraqi universities.

H4b: Digital competence mediates the relationship between collective obligation and educational innovation in Iraqi universities.

H4c: Digital competence mediates the relationship between resource fluidity and educational innovation in Iraqi universities.

Methodology

This section sets out how the study was actually conducted. It begins with the purpose of the research and the model that guided it, before turning to the population under study and the procedures used to draw the sample from it. The development of the data collection instrument is described next, followed by the fieldwork procedures used to gather the data. The section closes with an account of the statistical methods applied, all of which were carried out using SmartPLS.

Research Purpose and Model

Strategic agility and digital competence remain comparatively recent additions to the literature on educational innovation, and most of what has been written about either construct concerns firms rather than universities. This study takes up that gap directly. Its purpose is to determine whether digital competence mediates the effect of strategic agility on educational innovation, and, in the process, to examine how the three variables relate to one another more broadly. The model presented below sets out the hypothesized relationships among the independent, dependent, and mediating variables accordingly. The study is distinctive in a further respect worth flagging here: while a handful of studies have already examined the link between strategic agility and educational innovation, none, to the best of our knowledge, has tested digital competence as the mechanism through which that link actually operates, which is what gives the present research its point of originality.

Instrument Development

Educational Innovation. The dependent variable in this study, educational innovation, is treated as a single construct capturing the extent to which a university generates, adopts, and implements new ideas, methods, and improvements in how it teaches and operates. It was measured using a five-item scale adapted from Wang and Ahmed's (2004) work on developing and validating the organizational innovativeness construct. Respondents rated each item on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), such that a higher score reflects a higher level of educational innovation. The wording of individual items was adjusted slightly so the scale would sit comfortably within the higher-education context of Iraqi universities, though the underlying meaning of each item was preserved from the original.

The original item stems from Wang and Ahmed's (2004) innovativeness construct, adapted here into a single-dimension educational innovation scale, and is presented below.

1. Our institution frequently tries out new ideas in teaching and learning.
2. Our institution seeks out new ways to do things (methods, programs, or services).
3. Our institution is creative in its methods of operation and instruction.
4. Our institution is often the first to introduce new practices compared to other institutions.
5. Innovation is readily accepted in our institution's programs and management.

Strategic Agility: Strategic agility was measured using the well-established framework developed by Doz and Kosonen (2008), who conceptualize the construct as resting on three interrelated capabilities: strategic sensitivity, collective commitment, and resource fluidity. The study framed agility as a higher-order construct constituted by these three interconnected dimensions rather than treating it as a single non-distilled notion, since each represents in its own way how a university stays vital and receptive to its environment. Each of the items was measured on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating more strategic agility. Similar to the educational innovation scale, some wording of the items was adjusted to be more appropriate for Iraqi universities while also maintaining the original meaning of each item.

Dimension 1: Strategic Sensitivity

Honed ability to perceive, alertness to new threats and opportunities (Doz & Kosonen, 2009).

1. Our university keeps track of changes in the external environment.
2. Our university watches over new business prospects in the education market.
3. Our university is one that anticipates trends before they turn into sustained phenomena.
4. Our university welcomes discussion on strategic issues.

Dimension 2: Collective Obligation (Leadership Unity)

Encapsulates how top leadership is quickly able to make bold, unified decisions (Doz & Kosonen, 2009).

1. Where do we have commonality in direction and vision from our university's leaders?
2. Our university leaders can make rapid collective decisions.
3. Our leadership closes ranks around tough calls on strategy.
4. The decision-making process in our university is predicated on mutual trust between the leaders.

Dimension 3: Resource Fluidity

It encapsulates the inner ability to reorganize and redeploy resources at pace.

1. The incorporation of quick adaptability by pivoting university resources (staff, budget, and facilities) when necessary.
2. Our university redeploys people flexibly across tasks and units.
3. Our university adapts its structures and processes rapidly to new demands.
4. Our university mobilizes resources efficiently to support new initiatives.

Digital Competence. The mediating variable in this study, digital competence, is treated as a unidimensional construct reflecting the extent to which individuals possess the knowledge, skills, and confidence needed to use digital

technologies effectively and responsibly in their academic work. It was measured using items adapted from the European Digital Competence Framework (DigComp) developed by Carretero et al. (2017). All items were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating a greater level of digital competence. As with the preceding scales, item wording was adapted to suit the higher-education context of Iraqi universities, while the meaning of each item was kept consistent with the original framework.

The items below reflect the digital competence construct as conceptualized within the DigComp framework (Carretero et al., 2017), adapted here into a single-dimension scale.

I can use digital tools and technologies effectively in my academic work.

1. I am able to search, evaluate, and manage digital information and data.
2. I can communicate and collaborate with others using digital platforms.
3. I am able to create and edit digital content (documents, presentations, media).
4. I know how to protect my devices, data, and privacy in the digital environment.
5. I can solve technical problems and adapt to new digital tools when they arise.

Research population and sample selection

This study was carried out within Iraqi public universities, a setting currently undergoing considerable change on several fronts at once: institutional, technological, and educational (Montazer & Al-Rikabi, 2021). Since these conditions remain highly unsettled, the context of Iraqi Universities is perhaps as ideal as it gets for beginning to understand how strategic agility, digital competence, and educational innovation really complement one another in practice rather than rhetoric.

In order to balance generalizability and manageability, the sample was drawn from three of the largest public universities in the country, one in each region. The UOB stands for the central region, ranking 11th among universities at a global level, followed by the University of Basrah representing the south part, and finally the University of Mosul standing for the north part. These three cases were chosen for their sheer size and academic status, but also because, combined, they represent some of the wider diversity that marks the Iraqi higher education landscape in aggregate. A larger and more dispersed group of institutions would have diluted fieldwork to an unmanageable level, freeing it up from excessive data collection but limiting conclusions that could be made to a regionally narrow significance.

Participants in this study included both academic staff and academic leaders, faculty members working alongside department heads, deans, assistant deans, and program coordinators. This group was chosen deliberately. They are far enough removed from institutional decision-making to have meaningful things to say about the strategic direction of their university and their university's appetite for innovation, but also close enough that they use digital tools in some aspect of their day-to-day work and can reflect honestly on their own digital competence. They know how to respond with real confidence both on the institutional part of the survey and the individual one. The individual academic then becomes the unit of analysis for this research.

Sample and Data Collection

The data regarding the constructs used were collected by a structured questionnaire, all using a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Three universities were involved in distributing a total of 330 questionnaires, and responses were received from 265 (about an 80 percent return rate, which bodes well for a survey of this nature). Based on a thorough examination, questionnaires that were either incomplete or completed without due diligence were discarded, leaving 248 questionnaires as the basis for analysis. The adequacy of the sample size was verified using G*Power 3.1 software to exceed traditional approximation rules and ensure sufficient statistical power for structural equation modeling using partial least squares (PLS-SEM) (Hair et al., 2022). Based on four predictive variables, a mean effect size ($f^2 = 0.15$), a significance level ($\alpha = 0.05$), and a statistical power of 0.95, the minimum required sample size was determined to be 129 participants (Faul et al., 2009). The final sample size of 248 valid responses more than adequately exceeds this minimum, confirming its suitability for efficiently estimating both the standard and structural models.

Data Analysis Technique

The analysis employed Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS. Several reasons make this choice suited to the structure of the study. PLS-SEM is especially suited for models integrating mediating variables (Ringle et al., 2018); it better copes with the non-normality of data, such as that produced by Likert-scale responses (Murillo-Zamorano et al., 2021), and its predictive exploratory focus is practically aligned with this research's objectives.

Data Analysis and Results

The empirical results on the impact of strategic agility on educational innovation in Iraqi universities and the role of digital competence as a mediating variable in this relationship are shown in this chapter. The data were analyzed in SmartPLS 4 using Partial Least Squares Structural Equation Modeling (PLS-SEM) following the two-stage evaluation procedure recommended in the literature (Hair et al, 2022), as a first step by assessing the measurement model before considering the structural model itself.

Preliminary Data Screening

The 248 valid responses were screened for data quality before advancing to model estimation. Questionnaires containing excessive amounts of missing data had already been omitted in previous validity assessments, and the very small proportion (below 2 percent) of remaining missing values were appropriately managed via replacement with means. The data were checked for straight-lining and outliers by examining the trend of answers across repeated measures, and problematic cases were removed in a cleaning process.

As this study is based on a five-point Likert instrument, multivariate normality was tested by default. As expected, the data showed no strong departures from normality, with skewness and kurtosis remaining well within the limits of

± 1.96 . Because the technique makes no distributional assumptions and does well in situations where there are mediated paths within complex, hypothesized models, these conditions lend more support to the appropriateness of PLS-SEM for our study (Yáñez-Araque et al., 2017).

Specification of the Higher-Order Construct

Strategic Agility has been defined as a second-order construct that captures each of strategic agility's three first-order dimensions: strategic sensitivity, collective obligation, and resource fluidity. This type of analysis has been operationalized with the individual two-stage method advocated in the literature (Sarstedt et al., 2019). Firstly, each dimension was measured by multiple indicators in order to compute scores of the corresponding latent variables; secondly, these dimensions, once scored, were used as indicators to measure the latent variable of Strategic Agility. This design allowed us to test both our dimension-level and aggregate hypotheses all within the same continuous framework instead of separately analyzing the results at each level.

Thus, we have modeled Digital Competence as the mediating variable, which is placed between Strategic Agility (independent variable) and Educational Innovation (dependent variable). Measured with 4 items for each dimension of agility, using 6 items for Digital Competence and 5 items for Educational Innovation.

Measurement Model Assessment

To interpret the relationships among them, an evaluation of the measurement model was conducted first to ensure the reliability and validity of all constructs measured.

Reliability and Convergent Validity

In Table 4.1, all outer loadings (as shown in the final column of that table) exceeded 0.70, and as discussed above, each construct exceeded thresholds for Cronbach's alpha (≥ 0.70), composite reliability (≥ 0.70), and average variance extracted (AVE) (≥ 0.50).

Table 4.1 — Reliability and Convergent Validity

Construct	Items	Loadings (range)	α	CR (ρ_c)	AVE
Strategic Sensitivity	4	0.738 – 0.845	0.809	0.875	0.637
Collective Obligation	4	0.751 – 0.863	0.828	0.886	0.661
Resource Fluidity	4	0.726 – 0.831	0.795	0.866	0.618
Digital Competence	6	0.709 – 0.826	0.871	0.902	0.606
Educational Innovation	5	0.744 – 0.849	0.845	0.890	0.619

Source: Author's calculations based on SmartPLS 4 output.

These findings validate that the instrument is valid and that each construct is operationalized correctly.

Discriminant Validity

Heterotrait–Monotrait ratio (HTMT) was used to assess discriminant validity. Recall that the conservative 0.85 threshold (Roemer et al., 2021) was met for all values presented in Table 4.2, which allowed us to conclude empirical distinctiveness of constructs.

Table 4.2 — Discriminant Validity (HTMT)

	SS	CC	RF	DC	EI
CC	0.615				
RF	0.601	0.647			
DC	0.574	0.608	0.633		
EI	0.629	0.655	0.674	0.692	

Source: Author's calculations based on SmartPLS 4 output.

Structural Model Assessment

After confirming the measurement model, the structural model was assessed to test the proposed paths.

Collinearity

All VIF values of the inner model were between 1.39 and 2.28, which is below the suggested threshold value of five (Ringle et al., 2018), suggesting no collinearity problems and indicating that common method bias likely does not materially impact our study findings (Kock, 2015).

Explanatory and Predictive Power

Table 4.3 shows that a great amount of variance is explained for both endogenous constructs in this model, and as the value of Q^2 is positive, the predictive relevance is confirmed. (Sarstedt et al., 2014).

Table 4.3 — R^2 and Q^2 Values

Endogenous Construct	R^2	Adj. R^2	Q^2	Interpretation
Digital Competence	0.408	0.401	0.239	Moderate, predictive
Educational Innovation	0.531	0.523	0.308	Substantial, predictive

Source: Author's calculations based on SmartPLS 4 output.

Direct Effects

The significance of the path was tested through bootstrapping based on 5,000 subsamples. We supported a hypothesis when $p < 0.05$ and the t-value exceeded 1.96. The effect sizes (f^2) are reported to show practical significance.

Table 4.4 — Direct Path Results

Hyp.	Path	β	t	p	f^2	Decision
H1a	SS $\rightarrow$ EI	0.181	2.947	0.003	0.041	Supported
H1b	CC $\rightarrow$ EI	0.159	2.583	0.010	0.032	Supported

H1c	RF → EI	0.209	3.376	0.001	0.056	Supported
H2a	SS → DC	0.216	3.488	0.000	0.058	Supported
H2b	CC → DC	0.194	3.061	0.002	0.045	Supported
H2c	RF → DC	0.239	3.812	0.000	0.071	Supported
H3	DC → EI	0.291	4.446	0.000	0.118	Supported

Source: Author's calculations based on SmartPLS 4 output.

Using the second-stage latent scores, at the aggregate level:

Table 4.5 — Aggregate Path Results

Hyp.	Path	β	t	p	f ²	Decision
H1	Strategic Agility → EI	0.353	5.721	0.000	0.192	Supported
H2	Strategic Agility → DC	0.464	7.088	0.000	0.274	Supported

Source: Author's calculations based on SmartPLS 4 output.

All direct hypotheses were supported. We found that resource fluidity was the strongest driver of both digital competence and educational innovation, while digital competence had the most robust single-effect on educational innovation.

Mediation Analysis

Following (Nitzl et al., 2016), indirect effects, bias-corrected 95% confidence intervals, and the Variance Accounted For (VAF) were used to test whether digital competence is a mediating variable.

Table 4.6 — Mediation Results

Hyp.	Indirect Path	β	t	95% CI	VAF	Type	Decision
H4a	SS → DC → EI	0.063	2.714	(0.022, 0.109)	25.8%	Partial (complementary)	Supported
H4b	CC → DC → EI	0.056	2.531	(0.018, 0.101)	26.0%	Partial (complementary)	Supported
H4c	RF → DC → EI	0.070	2.903	(0.026, 0.118)	25.1%	Partial (complementary)	Supported
H4	Agility → DC → EI	0.135	3.998	(0.074, 0.201)	27.7%	Partial (complementary)	Supported

Source: Author's calculations based on SmartPLS 4 output.

All indirect effects were significant, with confidence intervals excluding zero. As both the direct and indirect paths were significant and positive, digital competence operates as a complementary partial mediator: between about one quarter and one-third of the strategic agility effect on educational innovation is mediated by digital competence, supporting its core role in this mediating model.

Discussion of Findings

This section begins to discuss the main findings over the course of the study relative to existing literature, is then positioned against existing scholarship, before concluding with their implications for research and practice regarding strategic agility, digital competence, and educational innovation in Iraq.

The findings indicate that strategic agility significantly boosts educational innovation in Iraqi universities (H1: $\beta = 0.353$) as justified by the basic logic found in the literature (Doz & Kosonen, 2010). What makes this finding of particular theoretical significance is the context in which it occurs: agility theory has been largely tested within stable, resource-rich organizational contexts, and the potency of this effect within a turbulent, resource-limited public system suggests something more. Given that the development and testing of agility has largely occurred in such stable contexts (Mueller-Saegebrecht & Walter, 2025), its resilience in circumstances of real constraint means that agility acts not as a luxury given stability but as a necessity dictated by turbulence, which recasts theory into the otherwise little-studied landscape of system transition within developing higher-education systems.

But perhaps the most distinguishable finding of this research was with regard to which dimension of agility actually does the heavy lifting. Resource fluidity dominated as the source of both innovation ($\beta = 0.209$) and digital competence ($\beta = 0.239$), a finding that inverts much of the Western literature, where sensing is often treated as agility's tip end (Clauß et al., 2019). Once this institutional context is considered, the inversion makes sense. In bureaucratically driven Iraqi universities, all of which are so centrally governed as to make the Ministry the actual "university," not identifying that change is needed is rarely the binding constraint; awareness is seldom a problem. That awareness is a baseline requirement, and the less trivial restriction lies in acting upon that awareness: moving money, shifting talent, and restructuring space when demands materialize. Interpreted in this manner, the result represents a distinctly contextual refinement of the agility model more suitable to transitional systems than the sensing-led accounts that characterize much current literature.

The rest of the pathways within the model also sit easily with theory. As our conceptual framework is in line with both the dynamic capabilities perspective (Teece, 2007) and the DigComp framework (Vuorikari et al., 2022), it seems reasonable to conclude that strategic agility enhances digital competence (H2: $\beta = 0.464$), which in turn propels educational innovation (H3: $\beta = 0.291$). Importantly, digital competence functioned as an additional partial mediator in this association (H4: indirect $\beta = 0.135$; VAF $\approx 28\%$), suggesting that nearly a quarter of agility's total effect on innovation is indirect via digital competence rather than direct effects on innovation being the *modus operandi*. This result draws together two bodies of literature that are typically kept apart: the organizational study of strategic agility and the individual-level study of digital skill, and in doing so reframes digital competence not as a peripheral outcome, but as the human mechanism through which institutional agility is converted into tangible innovation. For Iraqi universities still in the early stages of digital transformation, this repositions digital capability as a strategic priority in its own right, rather than a matter to be left to routine staff training.

Taken together, the study makes three distinct contributions to the literature. First, it extends agility theory into a volatile public-sector context where the theory's assumptions have rarely been tested. Second, it establishes resource fluidity rather than strategic sensitivity as the dominant driver of agility's effects within centralized systems, challenging the sensing-led emphasis of much prior work. Third, it provides empirical evidence that digital competence mediates the relationship between agility and innovation, bridging organizational and individual levels of analysis that are usually studied in isolation from one another.

But these contributions have practical weight as well. As the key bottleneck turned out to be not awareness but execution capacity, the single most consequential reform for Iraqi universities consists in relaxing the overly centralized controls around budgeting and staff redeployment structures that slow institutional response to pressing and well-identified needs. At the same time, staff digital capability should be treated as a deliberate strategic investment rather than an administrative afterthought. In sum, these findings move the conversation beyond the question of whether agility matters, toward a more useful question: how it actually operates within a specific, understudied environment. In doing so, the study offers both a theoretical refinement of the agility model and a practical roadmap for reform within Iraqi higher education.

Significance of the Study

Theoretical Significance:

The study derives its theoretical significance from its integration of strategic agility, educational innovation, digital competence, and into a single explanatory model. It adopts a "dynamic capabilities" perspective to illustrate how these elements interact to develop educational institutions.

Practical Significance:

The study offers practical insights for university leaders and decision-makers, highlighting the importance of resource flexibility and developing the digital skills of academic and administrative staff. This has helped transform agility/flexible plans and strategies into innovative and sustainable outcomes on the ground.

Conclusion

This study set out to understand how strategic agility shapes educational innovation in Iraqi universities, and what part digital competence plays in that relationship. The findings are consistent, and reasonably clear on the main point: strategic agility meaningfully advances educational innovation, and it does so most powerfully through resource fluidity the capacity to move budgets, staff, and facilities to where they are actually needed, rather than merely recognizing that a need exists. Equally important, digital competence emerged as the mechanism that carries agility through into practice, partially mediating the path from strategic capability to genuine innovation on the ground.

Overall, these findings place a decidedly Western theoretical model into an unstable, resource-deficient public-sector setting and thereby beg something worthy of serious consideration: that agility is not simply the province of stable institutions with ample resources available; it is also required in sustained operating environments. More importantly, there are practical implications for higher education in Iraq and, modestly speaking at least, hopeful implications. If universities can relax the centralized shackles that dictate their current patterns of resource deployment, and learn to see staff digital capability as a value-generating strategic investment rather than simply an administrative by-product, then rapid transformation will become a realistic proposition.

Apart from its narrow context, the study presents a more nuanced view of agile practice from an evidence-based standpoint, one that shifts beyond whether or not agility matters to offering a clearer account of when it works. It thus provides a platform that is rightfully on firm ground for future research in systems of education with parallel sets of transitional periods.

Funding

None

Acknowledgement

None

Conflicts of Interest

The author declares no conflict of interest.

English References:

- Abdullahi, F. & Naghibi, M., (2024), Applying Analytic Hierarchy Process for Site Selection of a Recreational-Educational Children Complex in Shiraz City, Iran, *Landescape Online*, V. 92, pp.1- 17.
- Adedokun, A. O. & Ajao, I. A., (2017), Security Considerations in ATM Site Selection in Nigeria, *Journal of Information Security*, V. 8, No. 4, pp. 242–251.
- Al-Janabi, S. R. and Askari, K., (2025), The role of digital transformation in the development of the electronic payment system in the Iraqi economy, *Economics and Administrative Studies Journal (EASJ)*, V. 4, No. 3, pp 96-113.
- Alkass, S., & Merza, A. (2003). Location Planning of ATM Machines Using Fuzzy Clustering and GIS,. *Proceedings of the 20th International Symposium on Automation and Robotics in Construction*.
- Al-Najjar, S. M., (1993). Multiple Objective Programming in the Management of the IBB Inventory System, Unpublished Ph.D. Dissertation In Business Administration, University of Baghdad.
- Atthirawong, W. & MacCarthy, B., (2005). An Application of the Analytical Hierarchy Process to International Location Decision Making, *International Journal of Operations and production Management*, V. 23, No. 7, pp. 794-818.
- Fuller, Robert & Carlson, Christer, (1996), *Fuzzy Multiple Criteria Decision Making: Recent Development*.
- Faul, F., Erdfelder, E., Buchner, A.-G., and Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, 41(4), 1149–1160. <https://doi.org/10.3758/BRM.41.4.1149>
- Fülöp, János, (2005), Introduction to Decision Making Methods, *Journal of Operations Research Society*, V. 56, No. 1, pp. 119-122.
- Geoffrion, A. M., Dyer, S. F. & Feinberg, A., (1972), An Interactive Approach for Multi-Criterion Optimization with an Application to the Operation of an Academic Department, *Management Science*, V. 19, pp.357 -368.
- Hernández, D. & Benavides, F., (2013), Model for ATM Location Optimization, *Journal of Financial Services Marketing*, V. 18, No. 1, pp. 39–47.
- Hair, J. F., Hult, G. T. M., Ringle, C. M., and Sarstedt, M. (2022). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (3rd ed.). Sage.
- Kumar, S., & Kanchana, R. S., (2016), Site selection criteria for ATM installation: A decision support framework, *International Journal of Scientific & Engineering Research*, V. 7, No. 3, pp. 650–654.

- Li, Y. & Yeh, A. G., (2005), Analyzing spatial restructuring of land use patterns in a fast growing region using remote sensing and GIS, *Landscape and Urban Planning*, V. 73, No. 1, pp. 55–65.
- Nasih, A. B. and Al-Mashadani, A., (2025), E-commerce and its role in the development of electronic banking service in Iraq, *Economics and Administrative Studies Journal (EASJ)*, V. 4, No. 3, pp 47-66.
- Ojha, M. & Pandey, A., (2015), Decision Support Model for ATM Site Selection Using AHP, *International Journal of Management Research & Review*, V. 5, No. 3, pp. 170–175.
- Reserve Bank of India (RBI) Guidelines (2011), Master Circular.
- Saaty, T. L., (2002), *Fundamentals of decision making and priority theory with the analytic hierarchy process*, RWS Publications, Pittsburgh.
- Safarzadeh, A., Jamali, M. and Moshiri, B. (2025). Enhancing precision of ATM network quality assessment : Machine Learning, *Journal of Expert System with Application*, arXiv.
- Sujit, K. (2013), ATM location analysis using GIS: A case study, *International Journal of Computer Applications*, V. 72, No. 4, pp. 10–16.
- Sutresno & Affandi, A. (2023). Technology Acceptance Model of ATM Machine Services: A Case Study of MyGraPARI within Analytical Hierarchy Process, *Airlangga Journal of Innovation Management*, V. 4, No.2, pp. 147-157.
- Taylor, B. W., (2002), *Management Science*; 7th ed., Pearson Education Inc. Upper Saddle River, New Jersey, USA.
- Wattayau, W. & Yun Peng, (2004), A Bayesian Network Based Framework for Multi-Criteria Decision Making. Whistler, B. C. Canada August 6-11.
- Yu, P. L. & Zeleney, M., (1975), The Set of All non-Dominated Solutions in Linear Cases and Multi-criteria Simplex Method, *Journal of Mathematical Analysis and Applications*, V. 49, pp.430-468.16.
- Zeleney, M. & Steuer, R. E., (1976), *Linear Multi objective Programing*, Lecture Notes in Economics and Mathematical Systems, No. 95, Springer Verlag, N.Y.
- Zionts, S. & Wallenius, J., (1976), An Interactive Programming Methods for Solving the Multiple Criteria Problem, *Management Science*, V.22, pp. 652-663.
- Zopounidis, C. & Dompos, M., (2002), Multi-criteria Decision Aid in Financial Decision Making: Methodologies and Literature Review, *Journal of Multi-criteria Decision Making*, V.11, pp. 167-186.