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TECHNOLOGICAL ADOPTION AND WORKER'S INNOVATIVE BEHAVIOUR OF TEACHING HOSPITALS IN RIVERS STATE

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ABSTRACT

Teaching hospitals in Rivers State continue to grapple with weak innovative behaviour among their workforce, a challenge manifested in sluggish idea generation and the frequent failure of promising improvements to reach implementation, even as investments in technology intensify. This study therefore examined the relationship between technological adoption and worker's innovative behaviour of teaching hospitals in Rivers State, with technological adoption operationalised through technological infrastructure and technological utilisation, and worker's innovative behaviour proxied by worker's idea generation and worker's idea implementation. Anchored in the Diffusion of Innovations Theory and the Technology Acceptance Model, the study adopted a positivist philosophy and a cross-sectional survey design. The accessible population comprised 320 healthcare workers drawn from the University of Port Harcourt Teaching Hospital and the Rivers State University Teaching Hospital, spanning clinical, administrative, technical and support staff. The Krejcie and Morgan table yielded a sample of 175 respondents selected through simple random sampling, and a structured questionnaire served as the instrument for data collection. Of the instruments administered, 155 (88.57%) were retrieved and 145 (82.86%) were adequately completed and usable. The hypotheses were tested at the 0.05 level of significance using Partial Least Squares-Structural Equation Modelling via SmartPLS 4.1.1.9. The results revealed that technological infrastructure had a negligible, negative and non-significant relationship with worker's idea generation (β = -0.004, p = 0.583), but a weak, positive and significant relationship with worker's idea implementation (β = 0.278, p = 0.001); technological utilisation exhibited a very strong, positive and significant relationship with worker's idea generation (β = 0.981, p = 0.000) and a moderate, positive and significant relationship with worker's idea implementation (β = 0.414, p = 0.004). The study concludes that the actual utilisation of technology, rather than its mere availability, is the dominant driver of innovative behaviour, and recommends that hospital management prioritise the intensive, work-embedded use of existing systems.

KEYWORDS: *Technological Adoption, Technological Infrastructure, Technological Utilisation, Worker's Idea Generation, Worker's Idea Implementation*

1.0 INTRODUCTION

Teaching hospitals occupy the apex of Nigeria's three-tier health system, discharging an interlocking mandate of specialised tertiary care, clinical training of the medical and allied-health workforce, and the generation of context-relevant health research. As the referral destinations for the most complex cases escalated from primary and secondary facilities, they are the institutions on which the credibility of the entire health system ultimately rests, and their performance shapes national indices of morbidity and mortality (Akinwale & George, 2023; Lawal et al., 2022). Yet, these same institutions operate under conditions of acute strain: chronic underfunding, obsolete and poorly maintained equipment, overstretched personnel, and digital health systems that clinicians repeatedly report as incomplete, difficult to use, and misaligned with clinical workflow (Onyeabor et al., 2025; Jeilani & Hussein, 2025). The paradox of the Nigerian teaching hospital is therefore one of enormous societal contribution delivered from a fragile and resource-constrained platform, a paradox that places a premium on the ingenuity of the workforce that keeps these institutions functioning. The most visible symptom of this fragility is the sustained haemorrhage of skilled human capital. Migration of doctors, nurses, and pharmacists to higher-income economies accelerated sharply after the COVID-19 pandemic, driven by poor remuneration, insecurity, weak career progression, and demoralising working environments, leaving the remaining workforce to absorb heavier caseloads under greater psychological pressure (Lawal et al., 2022; Akinwale & George, 2023). At the same time, evaluations of tertiary and university teaching hospitals in southern Nigeria have documented persistent feature gaps and usability deficiencies in the very digital systems intended to relieve that burden, so that technology often adds to, rather than reduces, the friction of daily work (Onyeabor et al., 2025; Edo et al., 2023). In such a setting, the capacity of ordinary workers to devise and apply better ways of working is not a luxury but a survival mechanism, and it is this capacity, captured in the construct of worker's innovative behaviour, that this study foregrounds. Worker's innovative behaviour refers

to the discretionary, self-initiated actions through which employees generate, promote, and put into practice novel and useful ideas that improve organisational processes, services, and outcomes (Wang et al., 2022; Parnitvitidkun et al., 2024). It is distinguished from creativity by its downstream, application-oriented character, since it embraces not only the conception of new ideas but also the effortful work of converting them into working routines and tangible improvements (Xu et al., 2022; Uppathampracha & Liu, 2022). In knowledge-intensive and turbulent environments such as teaching hospitals, this behaviour has become a decisive individual-level resource: it enables organisations to adapt services to shifting patient needs, to compensate for resource shortfalls through improvised solutions, and to sustain quality and resilience under pressure (Wang et al., 2022; Arshad et al., 2024). Where such behaviour is scarce, institutions ossify into rigid, error-prone routines; where it flourishes, they continuously renew themselves from within (Parnitvitidkun et al., 2024). Consistent with contemporary process conceptualisations, worker's innovative behaviour in this study is operationalised through two proxies that capture its principal stages, namely worker's idea generation and worker's idea implementation. Idea generation denotes the front-end cognitive activity of recognising problems and opportunities and producing original, workable solutions relevant to the context in which they will be applied (Li et al., 2022). Idea implementation denotes the back-end behavioural activity of championing, embedding, and routinising those ideas so that they become part of everyday work practice and yield actual improvement (Qammar et al., 2024). The two are complementary but conceptually distinct, since employees may be rich in ideas yet unable to enact them, or adept at execution yet dependent on others for the ideas themselves; treating them separately therefore allows a finer-grained understanding of where the innovation process succeeds or stalls (Parnitvitidkun et al., 2024; Xu et al., 2022).

A substantial body of evidence has sought to identify the antecedents that stimulate or suppress this behaviour. At the leadership and relational level, transformational, ethical, inclusive, and platform leadership have been shown to elevate innovative behaviour, largely by enlarging employees' psychological empowerment, self-efficacy, and engagement (Uppathampracha & Liu, 2022; Yuyi et al., 2025). At the contextual level, a supportive organisational and innovation climate, psychological safety, intrinsic motivation, and high-performance work systems consistently predict stronger idea generation and implementation (Xu et al., 2022; Arshad et al., 2024). At the individual level, proactive personality, creative self-efficacy, and perceptions of organisational justice further shape whether workers are willing to take the risks that innovation entails (Li et al., 2022; Qammar et al., 2024). What is striking about this literature, however, is the comparatively thin attention paid to the material and technological conditions under which employees actually work, even though those conditions plausibly determine both the raw material for new ideas and the practical feasibility of enacting them. It is against this backdrop that technological adoption emerges as a compelling but under-examined antecedent of worker's innovative behaviour in teaching hospitals. Technological adoption refers to the organisational and individual acceptance, assimilation, and routine use of digital and technological tools to accomplish work, a process explained by long-standing perspectives such as the Diffusion of Innovations Theory and the Technology Acceptance Model, whose contemporary applications continue to show that perceived usefulness, ease of use, and compatibility govern whether health workers embrace or resist the technologies available to them (Edo et al., 2023; Jeilani & Hussein, 2025). Where technology is well adopted, it expands the informational and operational canvas on which employees think, freeing time from routine drudgery, surfacing data that reveal problems and possibilities, and supplying the practical means to trial and scale new solutions (Jeilani & Hussein, 2025; Parnitvitidkun et al., 2024). Conversely, where adoption is shallow, workers are confined to manual, repetitive procedures that leave little cognitive space for generating ideas and few instruments for implementing them (Onyeabor et al., 2025; Edo et al., 2023). Technological adoption is thus theorised here not merely as a performance lever but as a precursor of the innovative behaviour through which performance is renewed. Technological adoption is a multidimensional construct, and this study captures it through two dimensions that jointly reflect the availability and the active use of technology, namely technological infrastructure and technological utilisation. Technological infrastructure denotes the underlying stock of hardware, connectivity, software platforms, and health information systems that a hospital possesses and maintains, and it establishes the objective ceiling of what workers can technologically accomplish (Jeilani & Hussein, 2025; Onyeabor et al., 2025). Technological utilisation denotes the extent to which that infrastructure is actually and effectively used by workers in the course of their duties, recognising that the mere presence of technology guarantees neither engagement nor benefit unless it is embedded in real work behaviour (Edo et al., 2023; Amoozegar et al., 2025). Distinguishing the two is analytically important because a hospital may possess adequate infrastructure that remains under-utilised, or may extract disproportionate value from modest infrastructure that is intensively used (Edo et al., 2023). It is on this reasoning that the present study, examines how technological infrastructure and technological utilisation relate to worker's idea generation and worker's idea implementation, grounding the inquiry in the Diffusion of Innovations Theory and the Technology Acceptance Model and testing the relationships through Partial Least Squares-Structural Equation Modelling (PLS-SEM) at the 0.05 level of significance.

1.1 Statement of the Problem

The survival and quality of teaching hospitals in Rivers State depend increasingly on a workforce that can think and act innovatively, yet there are strong indications that worker's innovative behaviour in these institutions is weak and inconsistent. Under conditions of severe resource constraint, staff attrition, and mounting clinical workload, the reasonable expectation is that workers would continuously devise and apply improvements to stretch scarce resources; instead, the prevailing pattern is one of adherence to fixed, manual routines

and a limited flow of enacted improvements (Akinwale & George, 2023; Onyeabor et al., 2025). This apparent deficit in the generation and implementation of new ideas is problematic precisely because innovative behaviour is the mechanism through which strained organisations renew themselves, and its weakness signals a loss of adaptive capacity at the very apex of the health system (Wang et al., 2022; Lawal et al., 2022). The problem manifests in several observable ways. There is limited participation of frontline workers in problem-solving and process improvement, a scarcity of locally originated solutions to recurrent operational bottlenecks, and a heavy reliance on paper-based and manual procedures even where digital alternatives exist (Edo et al., 2023). Suggestions for new practices, where they arise, frequently fail to progress beyond the idea stage into actual implementation, and resistance to, or disengagement from, available technological systems is commonly reported (Parnitvitidkun et al., 2024). Taken together, these manifestations describe a workforce whose idea generation is muted and whose idea implementation is stalled, leaving improvement initiatives fragmentary and short-lived (Xu et al., 2022; Wang et al., 2022). The causes of this state of affairs are multiple and interacting. The intense migration of skilled personnel depletes the experienced staff most likely to originate and drive change, while simultaneously raising the workload of those who remain, thereby crowding out the discretionary time and cognitive slack that innovation requires (Lawal et al., 2022). Weak technological infrastructure and the shallow utilisation of the systems that do exist deprive workers of both the information needed to identify opportunities and the tools needed to enact solutions (Jeilani & Hussein, 2025; Onyeabor et al., 2025). These material deficits are compounded by contextual conditions such as an unsupportive innovation climate, low psychological safety, and constrained empowerment, all of which are known to suppress innovative behaviour (Xu et al., 2022; Arshad et al., 2024). The effects are consequential for the institutions and the population they serve. A workforce that neither generates nor implements improvements condemns teaching hospitals to operational stagnation, avoidable inefficiency, and diminished responsiveness to changing patient needs, further eroding service quality already threatened by understaffing (Akinwale & George, 2023; Onyeabor et al., 2025). The absence of internally driven renewal weakens organisational resilience and competitiveness, deepens dependence on external and often unaffordable solutions, and can accelerate the very demoralisation and attrition that gave rise to the problem, producing a self-reinforcing cycle of decline (Wang et al., 2022; Uppathampracha & Liu, 2022). For a state whose teaching hospitals anchor tertiary care across the South-South, the cumulative cost of suppressed innovative behaviour is a health system that fails to improve even as demands upon it intensify (Lawal et al., 2022; Akinwale & George, 2023).

Scholars have proposed a range of remedies for weak innovative behaviour. A dominant strand prescribes leadership and climate interventions, arguing that transformational, ethical, and platform leadership, together with a supportive innovation climate, psychological safety, and intrinsic motivation, can unlock idea generation and implementation (Xu et al., 2022; Yuyi et al., 2025). A second strand emphasises human-resource architecture, showing that high-performance work systems, knowledge sharing, engagement, and empowerment strengthen employees' willingness and ability to innovate (Arshad et al., 2024; Uppathampracha & Liu, 2022). A third, more recent strand turns to technology, contending that investment in digital infrastructure and the promotion of its effective use enhance workers' performance and their capacity to adopt and enact new practices (Jeilani & Hussein, 2025; Edo et al., 2023). These contributions are valuable, but they remain largely disconnected from one another and only partially applicable to the specific realities of Nigerian teaching hospitals (Onyeabor et al., 2025; Amoozegar et al., 2025).

However, several gaps therefore persist in the literature. First, the extensive research on the antecedents of innovative behaviour concentrates on leadership, climate, and human-resource factors, while the technological conditions of work, particularly infrastructure and its utilisation, are seldom modelled as direct antecedents of innovative behaviour (Xu et al., 2022; Arshad et al., 2024). Second, the growing literature on technological adoption in healthcare tends to terminate its analysis at behavioural intention, usability, performance, or workload, stopping short of the innovative behaviour that adoption might catalyse (Edo et al., 2023; Jeilani & Hussein, 2025). Third, the few Nigerian studies that examine innovative work behaviour are situated largely in higher-education and other non-clinical settings, leaving teaching hospitals, and Rivers State specifically, empirically neglected (Amoozegar et al., 2025; Onyeabor et al., 2025). Fourth, methodologically, there is a paucity of studies that disaggregate technological adoption into infrastructure and utilisation and relate each to idea generation and idea implementation as distinct outcomes within a single variance-based structural model (Parnitvitidkun et al., 2024; Amoozegar et al., 2025).

The point of departure of this study is its integration of these fragmented concerns into one theoretically grounded and empirically testable model tailored to the Rivers State context. Rather than treating technology solely as a determinant of performance or workload, the study positions technological adoption, disaggregated into technological infrastructure and technological utilisation, as an antecedent of worker's innovative behaviour, itself disaggregated into worker's idea generation and worker's idea implementation (Edo et al., 2023; Jeilani & Hussein, 2025). By anchoring the inquiry in the Diffusion of Innovations Theory and the Technology Acceptance Model and analysing primary data from teaching hospitals in Rivers State through PLS-SEM, the study responds directly to the contextual, conceptual, and methodological gaps identified above and offers evidence on which dimension of technological adoption most strongly shapes which stage of the innovation process (Amoozegar et al., 2025; Onyeabor et al., 2025).

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1.2 Aim and Objectives of the Study

The aim of this study is to examine the relationship between technological adoption and worker's innovative behaviour of teaching hospitals in Rivers State, Nigeria. In specific terms, the objectives of the study are to:

1. examine the relationship between technological infrastructure and worker's idea generation of teaching hospitals in Rivers State;
2. ascertain the relationship between technological infrastructure and worker's idea implementation of teaching hospitals in Rivers State;
3. determine the relationship between technological utilisation and worker's idea generation of teaching hospitals in Rivers State; and
4. examine the relationship between technological utilisation and worker's idea implementation of teaching hospitals in Rivers State.

1.3 Research Questions

In line with the objectives above, the study sought to answer the following research questions:

1. What is the relationship between technological infrastructure and worker's idea generation of teaching hospitals in Rivers State?
2. What is the relationship between technological infrastructure and worker's idea implementation of teaching hospitals in Rivers State?
3. What is the relationship between technological utilisation and worker's idea generation of teaching hospitals in Rivers State?
4. What is the relationship between technological utilisation and worker's idea implementation of teaching hospitals in Rivers State?

1.4 Research Hypotheses

The following null hypotheses were formulated and tested at the 0.05 level of significance using Partial Least Squares Structural Equation Modelling (PLS-SEM):

1. Ho_1: There is no significant relationship between technological infrastructure and worker's idea generation of teaching hospitals in Rivers State.
2. Ho_2: There is no significant relationship between technological infrastructure and worker's idea implementation of teaching hospitals in Rivers State.
3. Ho_3: There is no significant relationship between technological utilisation and worker's idea generation of teaching hospitals in Rivers State.
4. Ho_4: There is no significant relationship between technological utilisation and worker's idea implementation of teaching hospitals in Rivers State.

2.0 LITERATURE REVIEW

2.1 Theoretical Framework

This study is anchored on two complementary theories that jointly illuminate how the adoption of technology shapes the innovative behaviour of workers in teaching hospitals, namely the Diffusion of Innovations Theory and the Technology Acceptance Model. The former explains the organisational and social process through which technological innovations spread and are assimilated, while the latter explains the individual, perceptual mechanisms that drive acceptance and use; together they provide a coherent lens for linking technological infrastructure and technological utilisation to worker's idea generation and idea implementation.

2.1.1 Diffusion of Innovations Theory

The Diffusion of Innovations Theory was propounded by the American communication scholar Everett M. Rogers in 1962 through his seminal book Diffusion of Innovations, and it has since been refined across successive editions into one of the most enduring frameworks in the social sciences for explaining how new ideas and technologies spread (Jeilani & Hussein, 2025; Maharati & Entezarian, 2023). In its essence, the theory conceptualises diffusion as the process by which an innovation is communicated through particular channels over time among the members of a social system, unfolding through the stages of knowledge, persuasion, decision, implementation and confirmation, and distributing adopters along an S-shaped curve into innovators, early adopters, the early and late majority, and laggards (Maharati & Entezarian, 2023). Its analytical core is the set of perceived attributes of an innovation, that is, relative advantage, compatibility, complexity, trialability and observability, which empirical work consistently shows to govern the speed and extent of adoption, with complexity typically retarding and the others accelerating uptake (Putteeraj et al., 2022; Jeilani & Hussein, 2025). Scholars have argued both for and against the framework: proponents commend its parsimony, cross-disciplinary portability and

predictive utility across agriculture, communication, education and health, whereas critics contend that it carries a pro-innovation bias, understates the agency of laggards and the possibility that rejection may be rational, and relies heavily on retrospective, recall-based accounts of adoption (Maharati & Entezarian, 2023; Edo et al., 2023). In application, the theory has been used to model the readiness of healthcare workers to adopt e-health platforms, where Putteeraj et al. (2022) found the five attributes to significantly predict adoption in a hospital setting, and to explain the assimilation of digital health technologies within hospital organisations more broadly (Jeilani & Hussein, 2025). The principal strengths of the theory lie in its intuitive stage logic, its recognition that adoption is socially embedded and mediated by opinion leaders and communication networks, and its adaptability to emerging technologies, while its notable weaknesses include the difficulty of operationalising some attributes uniformly, its relative silence on structural and resource constraints, and its tendency to treat the innovation as unproblematically beneficial (Maharati & Entezarian, 2023; Putteeraj et al., 2022; Jeilani & Hussein, 2025). Its implication is that the organisational spread and eventual routinisation of technology depend not merely on the technology's presence but on how its attributes are perceived and communicated among workers, so that managers seeking innovation must attend to relative advantage, compatibility and the reduction of complexity. The theory is therefore directly relevant to the present study because teaching hospitals in Rivers State constitute social systems within which technological infrastructure must diffuse and be utilised before it can enable workers to generate and implement new ideas; the extent and quality of that diffusion, captured here through technological infrastructure and technological utilisation, is theorised to condition worker's innovative behaviour (Jeilani & Hussein, 2025; Edo et al., 2023).

2.1.2 Technology Acceptance Model

The Technology Acceptance Model was propounded by Fred D. Davis in 1986, and formalised in his widely cited 1989 work, as an adaptation of the Theory of Reasoned Action specifically tailored to explain why individuals accept or reject information technology (Scherer et al., 2019; Granic & Marangunic, 2019). At its core, the model posits that two beliefs, perceived usefulness and perceived ease of use, determine a user's attitude towards a technology, which in turn shapes behavioural intention and, ultimately, actual system use; over time it has evolved into TAM2, TAM3 and the Unified Theory of Acceptance and Use of Technology (UTAUT) as scholars incorporated social, cognitive and facilitating-condition variables to widen its explanatory reach (Granic & Marangunic, 2019; Edo et al., 2023). Scholarly debate surrounding the model is vigorous: its defenders point to overwhelming meta-analytic evidence that perceived usefulness and ease of use are robust, replicable predictors of usage intention across technologies, cultures and sectors, while its critics argue that its very parsimony is a liability, that it over-relies on self-reported intention rather than observed use, neglects contextual, organisational and habitual determinants, and has generalisability limitations across settings (Scherer et al., 2019; Granic & Marangunic, 2019). The model has been applied extensively, including in developing-economy healthcare, where Edo et al. (2023) integrated it with UTAUT and found perceived ease of use and perceived usefulness to significantly influence Nigerian healthcare workers' adoption of digital health technologies, and in education, where Scherer et al. (2019) confirmed through meta-analytic structural equation modelling that the model's core beliefs explain substantial variance in teachers' technology adoption. Its strengths are its theoretical clarity, empirical robustness, ease of measurement and adaptability, whereas its weaknesses include an individualistic, intention-centred focus that can obscure infrastructural and managerial enablers, limited attention to the quality and depth of use, and an assumption of voluntariness that fits imperfectly with mandated hospital systems (Granic & Marangunic, 2019). The model's implication is that the productive use of any technology hinges on workers' perceptions of its usefulness and ease, so that investments in infrastructure will translate into behaviour only when the technology is perceived as beneficial and usable. This makes the model highly relevant to the present study, since the degree to which teaching-hospital workers in Rivers State actually utilise available technological infrastructure, and thereby gain the informational and operational latitude to generate and implement new ideas, is expected to depend on the acceptance mechanisms the model specifies, complementing the diffusion-level account with an individual-level explanation of technological utilisation and its innovative consequences (Edo et al., 2023; Scherer et al., 2019).

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2.2 Conceptual Review

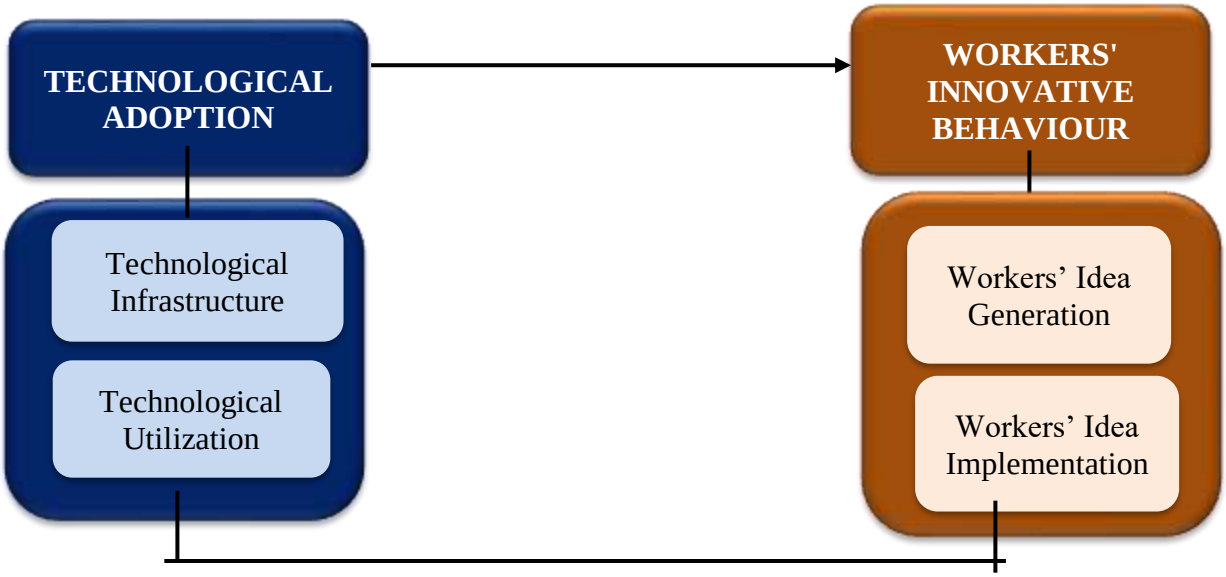

Figure 1: Conceptual Framework

Source: Conceptualised by the Researcher. The dimensions of technological adoption were adapted from Carvalho et al., (2023), Nassani et al., (2024), Edo et al., (2023), Zhang et al., (2023) and Zhou et al., (2024); while the proxies of workers' innovative behaviour were Parnitvitidkun et al. (2024), Wang et al, (2022) and Carvalho et al. (2023).

2.2.1 Technological Adoption

Conceptually, technological adoption refers to the organisational and individual decision to accept, assimilate and put into routine use a technological innovation to accomplish work, and it is understood in the literature as a process rather than a discrete event, spanning awareness, acceptance, implementation and continued use (Jeilani & Hussein, 2025; Edo et al., 2023). Scholarly argument about the construct is unsettled in ways that matter for the Nigerian teaching-hospital context: one tradition, anchored in the Technology Acceptance Model, locates adoption chiefly in individual perceptions of usefulness and ease of use, whereas a second tradition, anchored in diffusion and technology–organisation–environment reasoning, insists that adoption is fundamentally shaped by organisational readiness, infrastructure and environmental pressures (Edo et al., 2023; Jeilani & Hussein, 2025). The strength of the construct lies in its integrative capacity to connect individual behaviour, organisational capability and innovation outcomes, and in its demonstrated predictive value, with digital-competence adoption explaining a substantial share of the variance in innovative work behaviour among public-sector employees (Carvalho et al., 2023; Jeilani & Hussein, 2025). Its weaknesses, however, include a persistent conflation of intention with actual use, an over-concentration on the decision to adopt at the expense of the depth and quality of subsequent use, and a literature skewed towards developed economies whose infrastructural assumptions do not travel well to resource-constrained African hospitals (Edo et al., 2023; Onyeabor et al., 2025). The implication for the present study is that technological adoption cannot be treated as a monolith; it must be disaggregated into the availability of technology and its actual use, since these may diverge sharply in Nigerian teaching hospitals. Accordingly, technological adoption is retained as the study's overarching independent construct and operationalised through technological infrastructure and technological utilisation (Carvalho et al., 2023; Jeilani & Hussein, 2025).

2.2.2 Technological Infrastructure

In organisational scholarship, technological infrastructure denotes the stock of hardware, network connectivity, software platforms, and information systems that an organisation owns and maintains, together with the physical and digital architecture that establishes the objective ceiling of what its workers can technologically accomplish (Carvalho et al., 2023; Nassani et al., 2024). Arguments about the construct converge on its foundational status but diverge on its sufficiency: one strand treats infrastructure as a necessary enabling condition whose absence renders innovation infeasible, while another cautions that infrastructure is inert capital that yields no innovative return unless it is embedded in supportive capabilities, resilience and flexible use (Anser et al., 2021). The strengths of the construct are its concreteness, its measurability and its demonstrated empirical association with innovative work behaviour, as evidenced by findings that digital infrastructure positively and significantly predicts such behaviour and that knowledge-management infrastructure capabilities enable it through resilience and flexibility (Carvalho et al., 2023; Nassani et al., 2024; Anser et al., 2021). Its weaknesses include a

tendency in some studies to equate infrastructural provision with effective use, a relative neglect of maintenance, obsolescence and the recurrent costs that plague low-resource systems, and measurement approaches that capture ownership better than adequacy or reliability (Onyeabor et al., 2025). The implication is that provisioning technology is a precondition but not a guarantee of innovation, since infrastructure creates the possibility space within which workers may or may not generate and implement ideas.

2.2.3 Technological Utilisation

Technological utilisation refers to the extent to which the technological infrastructure available to an organisation is actually and effectively employed by workers in the course of their duties, shifting analytical attention from the mere presence of technology to the intensity, breadth and quality of its use (Zhou et al., 2024). The central argument surrounding the construct is that availability and use are conceptually and empirically distinct, since an organisation may possess adequate infrastructure that remains under-utilised, or may extract disproportionate value from modest infrastructure that is intensively and skilfully used, a distinction that the Technology Acceptance Model helps explain through perceived usefulness and ease of use as determinants of actual use (Edo et al., 2023; Zhang et al., 2023). A further debate concerns the valence of use: a growing body of evidence indicates that active, work-related use of technology can stimulate innovative behaviour by expanding access to information and freeing cognitive resources, whereas excessive, poorly bounded or non-work use may fragment attention and blunt its benefits, implying that the relationship between use and innovation is contingent rather than uniformly positive (Zhou et al., 2024; Zhang et al., 2023). The strengths of the construct are its behavioural realism, its capacity to explain why identical infrastructure yields different outcomes across units, and its empirical linkage to innovative job performance, with information-and-communication-technology use shown to positively influence such performance (Zhang et al., 2023; Zhou et al., 2024). Its weaknesses include inconsistent operationalisation across studies, difficulty in distinguishing productive from unproductive use, and a comparative scarcity of evidence from African healthcare settings (Zhou et al., 2024; Onyeabor et al., 2025). The implication is that innovation is driven less by what technology an organisation owns than by how thoroughly its workers use it.

2.2.4 Worker's Innovative Behaviour

Conceptually, worker's innovative behaviour, often rendered as innovative work behaviour, refers to the discretionary, self-initiated actions through which employees generate, promote and implement novel and useful ideas that benefit their role, unit or organisation, and it is widely distinguished from creativity by its downstream, application-oriented character (Wang et al., 2022; Parnitvitidkun et al., 2024). Scholarly argument centres on the construct's dimensionality and its status as antecedent or outcome: some scholars model it as a unidimensional disposition, others as a multi-stage process spanning opportunity exploration, idea generation, promotion and implementation, and still others as both a consequence of contextual enablers and a driver of organisational renewal (Xu et al., 2022). This debate is consequential because, in resource-constrained Nigerian institutions, innovative behaviour functions less as a discretionary extra than as a survival mechanism through which workers improvise solutions to compensate for chronic shortfalls, a role underscored by Nigerian evidence linking high-performance work systems and creativity to such behaviour among university employees (Amoozegar et al., 2025; Xu et al., 2022). The strengths of the construct are its strong theoretical grounding, its demonstrated relationship with organisational adaptability and competitiveness, and its sensitivity to a wide array of antecedents including leadership, climate, empowerment and, increasingly, technology (Uppathampracha & Liu, 2022; Qammar et al., 2024). Its weaknesses include reliance on self-report measures vulnerable to social-desirability bias, definitional overlap with creativity and proactivity, and a literature that has concentrated on leadership and human-resource antecedents while under-examining technological ones. The implication is that innovative behaviour is the mechanism through which strained organisations renew themselves, so its determinants merit close study in exactly the setting the present research targets.

2.2.5 Worker's Idea Generation

Idea generation is the front-end, cognitive stage of the innovation process in which the worker recognises problems and opportunities and produces original, workable solutions that are new to the context in which they will be applied (Parnitvitidkun et al., 2024; Li et al., 2022). Argument about the construct concerns both its antecedents and its boundaries: some scholars treat it as near-synonymous with creativity, while others insist it is a distinct behavioural stage that precedes and is analytically separable from promotion and implementation, and empirical work increasingly shows that different antecedents drive generation than drive implementation (Qammar et al., 2024). A further debate concerns its enabling conditions, with evidence pointing to proactive personality, creative self-efficacy, psychological safety and access to information as key stimulants, the last of which directly implicates technology as a supplier of the informational raw material for new ideas (Li et al., 2022; Xu et al., 2022). The strengths of the construct are its precision in isolating the origination of novelty, its measurability and its established sensitivity to individual and contextual predictors (Parnitvitidkun et al., 2024; Li et al., 2022). Its weaknesses include its dependence on subjective assessment, the risk of counting ideas without regard to quality, and the fact that generation alone yields no benefit unless followed by implementation (Wang et al., 2022; Qammar et al., 2024). The implication is that the origination of ideas is a necessary but insufficient stage of innovation whose stimulation may depend materially on the technological environment. This grounds the study's treatment of idea generation as a proxy of worker's innovative behaviour and supports the hypothesised links from technological infrastructure and technological utilisation to this front-end of the innovation process.

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2.2.6 Worker's Idea Implementation

Worker's idea implementation pairs "idea" with "implementation," from the Latin implere (to fill up or fulfil), conveying the fulfilment or carrying-out of a notion. Conceptually, idea implementation is the back-end, behavioural stage of the innovation process in which promising ideas are championed, embedded and routinised so that they become part of everyday work practice and yield tangible improvement (Wang et al., 2022; Parnitvitidkun et al., 2024). The dominant argument surrounding the construct is that implementation is both distinct from and harder than generation, since it demands persistence, resources, political skill and the overcoming of organisational inertia, which is why many generated ideas never reach fruition, a gap that scholars increasingly attribute to implementation-specific antecedents rather than to a deficit of ideas (Parnitvitidkun et al., 2024; Qammar et al., 2024). A related debate concerns the role of enabling infrastructure and use: implementation is theorised to depend on the practical means to trial and scale solutions, so that technological infrastructure and its effective utilisation are plausibly stronger enablers of implementation than of generation (Carvalho et al., 2023; Zhang et al., 2023). The strengths of the construct are its outcome-orientation, its capacity to capture the realisation of value from ideas, and its demonstrated responsiveness to organisational and technological enablers (Wang et al., 2022; Carvalho et al., 2023). Its weaknesses include measurement difficulties in attributing implemented changes to specific individuals, potential conflation with routine task performance, and the influence of factors beyond the worker's control such as budget and authority (Parnitvitidkun et al., 2024; Qammar et al., 2024). The implication is that innovation is completed, and its benefits realised, only at the implementation stage, whose enablement may hinge on the technological platform available to workers. This justifies the adoption of idea implementation as the second proxy of worker's innovative behaviour and the study's hypothesised links from technological infrastructure and technological utilisation to this decisive, value-realising stage of the innovation process (Carvalho et al., 2023; Parnitvitidkun et al., 2024).

2.3 Empirical Review

2.3.1 Technological Adoption and Worker's Innovative Behaviour

Carvalho et al. (2023) carried out a study on the topic "Predictors of digital competence of public university employees and the impact on innovative work behavior," which examined technological adoption, operationalised as digital competence, as a determinant of innovative work behaviour. The population of the study comprised the public employees (civil servants) of a Brazilian Federal Institution of Higher Education distributed across twelve administrative sectors, from which the sample was 181 validly completed responses obtained out of 540 employees targeted, representing a 33.5% response rate. The sampling technique adopted was voluntary, non-probability participation across all twelve sectors, while the method of data collection was a self-administered online questionnaire measured on a five-point Likert scale, and the method of data analysis was Partial Least Squares Structural Equation Modelling (PLS-SEM) executed in SmartPLS 4. The findings established that all three dimensions of digital competence positively and significantly predicted innovative work behaviour, with digital management exerting the strongest effect ($\beta = 0.394$, $p < 0.001$), followed by digital infrastructure ($\beta = 0.242$, $p < 0.001$) and digital integration ($\beta = 0.208$, $p < 0.01$), the model collectively explaining 48.9% of the variance in innovative work behaviour ($R^2 = 0.489$). In comparison with the present study, Carvalho et al. (2023) likewise treat technological adoption as an antecedent of innovative behaviour and employ PLS-SEM, the very technique adopted here, yet the present study is situated in Nigerian teaching hospitals rather than a Brazilian university, disaggregates the outcome into idea generation and idea implementation, and foregrounds infrastructure and utilisation as distinct dimensions. The gap in the literature is therefore contextual and conceptual, in that the Brazilian, higher-education setting and the composite digital-competence framing leave unexamined how technological adoption relates to the separate stages of innovative behaviour among clinical and non-clinical hospital workers in a resource-constrained African health system, which the present study addresses.

Gao and Gao (2024) conducted a study on the topic "How does digital leadership foster employee innovative behavior: A cognitive–affective processing system perspective," investigating how a technology-oriented leadership approach, as a driver of organisational technology adoption, influences employee innovative behaviour. The population of the study comprised employees of manufacturing firms undergoing digital transformation in Shandong Province, China, from which the sample consisted of 359 usable responses retained after 150 invalid returns were removed from the 509 questionnaires collected. The sampling technique was a non-probability snowball and convenience approach, in which the survey link was circulated to contacts and forwarded onward with the assistance of human-resource staff, the method of data collection was a two-stage (pilot and main) web-based self-administered questionnaire, and the method of data analysis was structural equation modelling with bootstrapped mediation testing. The findings revealed a strong, statistically significant positive total effect of digital leadership on employee innovative behaviour ($\beta = 0.357$, $p < 0.001$, 95% CI [0.214, 0.492]), with psychological empowerment ($\beta = 0.374$) and affective commitment ($\beta = 0.216$) serving as mediators. In comparison with the present study, Gao and Gao (2024) share the outcome variable of innovative behaviour and the use of structural equation modelling, but they conceptualise the technological antecedent as leadership rather than as infrastructure and utilisation, and their Chinese manufacturing sample differs markedly from Nigerian teaching hospitals. The gap in the literature lies in the fact that leadership-centred adoption reveals little about how the concrete availability and use of technology relate to innovative behaviour, and nothing about the health-sector, South-South Nigerian context, both of which the present study is designed to illuminate.

Wang et al. (2025) undertook a study on the topic "Do digital technology-related demands facilitate employees' innovative behavior? The effects of career resilience and perceived organizational support," which tested whether engagement with digital technology, framed as digital technology-related demands, promotes innovative behaviour. The population of the study comprised employees experiencing organisational digital transformation, from which the sample was 241 respondents. The sampling technique was non-probability convenience sampling administered through an online survey platform, the method of data collection was a self-administered questionnaire measured on validated Likert scales, and the method of data analysis combined hierarchical regression with path analysis. The findings demonstrated that digital technology-related demands exerted a significant positive effect on employees' innovative behaviour, that career resilience partially mediated this relationship, and that perceived organisational support significantly strengthened the effect of these demands, thereby amplifying the indirect path to innovative behaviour. In comparison with the present study, Wang et al. (2025) affirm a positive technology–innovation linkage at the individual level, but they rely on convenience sampling and regression-based path analysis rather than the PLS-SEM applied here, and their outcome is undifferentiated innovative behaviour rather than the idea-generation and idea-implementation proxies of this study. The gap in the literature is both methodological and contextual, in that the study neither disaggregates innovative behaviour nor addresses the Nigerian teaching-hospital workforce, leaving open the questions the present study pursues.

2.3.2 Technological Infrastructure and Worker's Innovative Behaviour

Nassani et al. (2024) conducted a study on the topic "Knowledge management infrastructure capabilities towards innovative work behavior: Employee's resilience and role of functional flexibility," which examined infrastructure capabilities as antecedents of innovative work behaviour. The population of the study comprised the employees of tourism firms, from which the sample was 374 employees. The sampling technique adopted was the random sampling method, the method of data collection was a structured questionnaire, and the method of data analysis was structural equation modelling (SEM). The findings demonstrated that knowledge-management infrastructure capabilities had a significant and positive link with innovative work behaviour, that employee resilience mediated the relationship, and that functional flexibility moderated it, jointly exerting a positive and significant impact on innovative work behaviour. In comparison with the present study, Nassani et al. (2024) confirm that infrastructure capabilities enable innovative behaviour and, like this study, use structural-equation techniques, but their infrastructure construct is knowledge-management oriented and their sample is drawn from tourism firms rather than teaching hospitals, while innovative behaviour is left undifferentiated. The gap in the literature is that the study neither isolates technological infrastructure and its utilisation as distinct predictors nor examines the idea-generation and idea-implementation stages in a Nigerian healthcare setting, which the present study undertakes.

Anser et al. (2021) carried out a study on the topic "Towards innovative work behavior through knowledge management infrastructure capabilities: Mediating role of functional flexibility and knowledge sharing," investigating how infrastructure capabilities translate into innovative work behaviour. The population of the study comprised production-line workers in manufacturing businesses, from which the sample was 894 workers. The sampling technique was a survey of production-line workers within manufacturing businesses, the method of data collection was self-administered questionnaires, and the method of data analysis was structural equation modelling. The findings established that knowledge-management infrastructure capabilities had a significant and positive relationship with innovative work behaviour, that functional flexibility and knowledge sharing fully mediated this relationship, and that knowledge sharing significantly moderated the link between infrastructure capabilities and functional flexibility. In comparison with the present study, Anser et al. (2021) reinforce the infrastructure–innovation nexus and employ a comparable analytical framework, yet they situate the inquiry in manufacturing rather than healthcare, treat infrastructure as a knowledge-management capability rather than as technological infrastructure and utilisation, and do not decompose innovative behaviour. The gap in the literature therefore lies in the absence of evidence on how technological infrastructure specifically relates to the distinct stages of innovative behaviour among teaching-hospital workers in Rivers State, a gap the present study is designed to close.

Carvalho et al. (2023), in the study titled "Predictors of digital competence of public university employees and the impact on innovative work behavior," provide dimension-specific evidence on technological infrastructure through the digital-infrastructure path of their model. The population of the study comprised the public employees of a Brazilian Federal Institution of Higher Education, from which the sample was 181 valid responses drawn from 540 employees targeted; the sampling technique was voluntary, non-probability participation, the method of data collection was a self-administered five-point Likert questionnaire, and the method of data analysis was PLS-SEM in SmartPLS 4. The findings, in respect of the infrastructure dimension, showed that digital infrastructure exerted a positive and statistically significant effect on innovative work behaviour ($\beta = 0.242$, $p < 0.001$), with the authors concluding that the absence of adequate infrastructure would render the innovative process unfeasible. In comparison with the present study, this evidence directly supports the hypothesised infrastructure–innovation link and shares the PLS-SEM methodology, but it is drawn from a Brazilian university workforce, measures infrastructure in terms of digital-competence perceptions, and does not separate idea generation from idea implementation. The gap in the literature is the untested application of this relationship to Nigerian teaching hospitals and to the two distinct stages of innovative behaviour, which the present study addresses.

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2.3.3 Technological Utilisation and Worker's Innovative Behaviour

Zhou et al. (2024) conducted a study on the topic "Effects of nonwork-related mobile technology active and passive use during working hours on employees' innovative behavior: A conditional process model," which examined how the actual use of technology relates to innovative behaviour. The population of the study comprised working employees within the Chinese organisational context, from which the sample was a body of employees surveyed at work. The findings revealed that work-time active technology use had a curvilinear relationship with innovative behaviour, whereas passive use had a linear relationship, that vitality mediated these relationships nonlinearly and linearly respectively, and that proactive personality moderated them, demonstrating that the innovative consequences of technology use are contingent on its type and intensity. In comparison with the present study, Zhou et al. (2024) foreground technological utilisation rather than mere availability, consistent with this study's emphasis, but they examine non-work-related use and its curvilinear effects rather than the purposeful work-related utilisation of hospital systems, and their outcome is undifferentiated innovative behaviour. The gap in the literature lies in the absence of evidence on how purposeful, work-related technological utilisation relates to idea generation and idea implementation among teaching-hospital workers, which the present study investigates.

Zhang et al. (2023) carried out a study on the topic "A person-environment fit model to explain information and communication technologies-enabled after-hours work-related interruptions in China," which tested how information-and-communication-technology use relates to innovative job performance. The population of the study comprised Chinese employees who are users of information and communication technologies, from which the sample was 277 respondents with an average age of 32.04 years. The method of data collection was a validated online questionnaire, and the method of data analysis was PLS-based structural equation modelling. The findings indicated that information-and-communication-technology-enabled work-related use exerted a significant positive influence on innovative job performance ($\beta = 0.139$, $p < 0.05$) and on in-role job performance ($\beta = 0.200$, $p < 0.01$; $\beta = 0.298$, $p < 0.001$), and that polychronicity significantly moderated the effect on innovative job performance ($\beta = 0.112$, $p < 0.05$). In comparison with the present study, Zhang et al. (2023) affirm that technological utilisation can enhance innovative outcomes and, like this study, apply PLS-SEM, but their outcome is innovative job performance rather than innovative work behaviour, their setting is Chinese employees generally, and they do not isolate idea generation and implementation. The gap in the literature is the untested transfer of the utilisation–innovation relationship to Nigerian teaching-hospital workers and to the specific stages of innovative behaviour, which the present study pursues.
Wang et al. (2025), in the study titled "Do digital technology-related demands facilitate employees' innovative behavior? The effects of career resilience and perceived organizational support," also speak to technological utilisation, since digital technology-related demands arise directly from the active use of and engagement with digital technology at work. The population of the study comprised employees undergoing digital transformation, from which the sample was 241 respondents; the sampling technique was non-probability convenience sampling on an online platform, the method of data collection was a validated Likert-scaled questionnaire, and the method of data analysis combined hierarchical regression with path analysis. The findings showed that digital technology-related demands, reflecting intensive technological use, significantly and positively influenced innovative behaviour, with career resilience partially mediating the relationship and perceived organisational support strengthening the pathway. In comparison with the present study, Wang et al. (2025) support a positive utilisation–innovation linkage but frame use as a set of demands rather than as purposeful work utilisation, rely on regression-based path analysis rather than PLS-SEM, and do not decompose the outcome. The gap in the literature is that neither the differentiated stages of innovative behaviour nor the Nigerian teaching-hospital workforce are examined, gaps the present study is structured to fill.

3.0 METHODOLOGY

This study was underpinned by the positivist research philosophy and adopted the cross-sectional survey design, an approach considered appropriate because the constructs of interest were measured across a defined body of respondents at a single point in time and the relationships among them were subjected to objective statistical estimation. The target population comprised all the teaching hospitals in Rivers State. However, the elements of the accessible population were restricted to 320 healthcare workers drawn from two teaching hospitals in Rivers State, namely the University of Port Harcourt Teaching Hospital and the Rivers State University Teaching Hospital, encompassing clinical staff such as doctors, nurses, pharmacists, laboratory scientists, radiographers, dentists, optometrists, prosthetists and social workers, as well as administrative, technical and support staff drawn from the relevant departments of both institutions. The choice of these two hospitals was informed by their status as the principal tertiary teaching-and-referral facilities in the state, which makes their workforce a suitably rich and representative pool for examining the phenomena under study. In determining an adequate sample, the Krejcie and Morgan (1970) sample size determination table was utilised, yielding a sample size of 175 respondents from the accessible population of 320 healthcare workers. The simple random sampling technique was adopted, with the aid of a computer-generated table of random numbers, so as to give every member of the accessible population an equal and independent chance of being selected and thereby minimise selection bias. A structured questionnaire, designed on a five-point Likert scale and carrying validated statement items for each construct, served as the instrument for data collection; the items measuring technological infrastructure and technological utilisation captured the two dimensions of technological adoption, while those measuring worker's idea generation and worker's idea implementation captured the two proxies of worker's innovative behaviour. A reliability cut-off point of 0.7 was adopted

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in evaluating the internal consistency of the instrument. The hypotheses were tested at the 0.05 level of significance by deploying the Partial Least Squares Structural Equation Modelling (PLS-SEM) technique via the SmartPLS 4.1.1.9 software. The adoption of PLS-SEM was informed by the fact that it is robust, flexible, and well suited to management research of this nature, since it accommodates non-normal data, handles complex models with multiple constructs, and simultaneously evaluates both the measurement model and the structural model. In interpreting the output, the decision rule for the two-tailed test was that t-values greater than 1.96 and p-values less than 0.05 denote statistically significant relationships, whereas t-values less than 1.96 and p-values greater than 0.05 denote non-significant relationships (Hair et al., 2014).

4.0 ANALYSIS AND RESULTS

4.1 Questionnaire Response Rate

The distribution and retrieval of the research instrument are summarised in Table 1. Of the 175 copies administered, 155 copies representing 88.57% were retrieved, out of which 10 copies representing 5.71% were found to be defective, leaving 145 copies representing 82.86% that were adequately completed and used for the analysis. The retrieval and usable rates are well above the threshold generally regarded as adequate for survey research, lending confidence to the representativeness of the responses.

Table 1: Questionnaire Response Rate

Questionnaire	Frequency	Percentage (%)
Number Administered	175	100
Number Retrieved	155	88.57
Number of Defected Responses	10	5.71
Number Used	145	82.86

Source: Field Survey, 2026

4.2 Descriptive Statistics

This section presents the item-by-item descriptive statistics for each of the four constructs, reporting the mean, standard deviation, variance, and the skewness and kurtosis statistics together with their standard errors, so as to establish the central tendency, dispersion and distributional shape of the responses (N = 145) prior to model estimation.

Table 2: Descriptive Statistics for Technological Infrastructure

Statement	N	Mean	Std. Dev.	Variance	Skew. Stat.	Skew. SE	Kurt. Stat.	Kurt. SE
i. My hospital is equipped with adequate computers, devices and hardware to support my work.	145	2.93	.992	.985	.027	.171	-.496	.341
ii. The hospital's information systems and software platforms are available for use in my unit.	145	2.54	1.008	1.015	.334	.171	.052	.341
iii. Reliable internet and network connectivity are provided to support work processes in my hospital.	145	3.82	1.181	1.394	-.701	.171	-.477	.341
iv. The digital infrastructure of my hospital is capable of meeting the needs of my work processes.	145	3.23	1.032	1.065	.014	.171	-.731	.341
v. My hospital maintains and regularly upgrades its technological facilities.	145	3.50	.953	.908	-.174	.171	-.467	.341
vi. The available technological infrastructure provides a dependable foundation for carrying out my duties.	145	3.05	1.031	1.062	.038	.171	-.405	.341
Valid N (listwise)	145							

Source: SPSS Research Output, 2026

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Table 3: Descriptive Statistics for Technological Utilisation

Statement	N	Mean	Std. Dev.	Variance	Skew. Stat.	Skew. SE	Kurt. Stat.	Kurt. SE
i. I regularly use the available technological systems to accomplish my work tasks.	145	2.97	1.135	1.287	-.014	.171	-.619	.341
ii. I make effective use of the hospital's digital tools in my daily responsibilities.	145	3.02	1.090	1.188	-.119	.171	-.820	.341
iii. I apply the functionalities of the hospital's information systems to solve work-related problems.	145	2.87	1.114	1.241	.180	.171	-.446	.341
iv. I integrate different digital technologies to carry out my work more efficiently.	145	2.84	1.152	1.328	.196	.171	-.588	.341
v. I use the available technology to access the information I need for my duties.	145	2.91	1.025	1.051	.050	.171	-.252	.341
vi. I fully utilise the technological resources provided by the hospital in my work processes.	145	2.95	1.149	1.321	-.002	.171	-.760	.341
Valid N (listwise)	145							

Source: SPSS Research Output, 2026

Table 4: Descriptive Statistics for Worker's Idea Generation

Statement	N	Mean	Std. Dev.	Variance	Skew. Stat.	Skew. SE	Kurt. Stat.	Kurt. SE
i. I search for new opportunities to improve processes or services in my hospital.	145	2.84	1.152	1.328	.196	.171	-.588	.341
ii. I generate original ideas and solutions to problems encountered in my work.	145	2.91	1.025	1.051	.050	.171	-.252	.341
iii. I identify better ways of performing tasks within my unit.	145	2.54	1.008	1.015	.334	.171	.052	.341
iv. I come up with new approaches to address challenges in service delivery.	145	3.02	1.090	1.188	-.119	.171	-.820	.341
v. I explore fresh methods and possibilities for improving my work.	145	2.87	1.114	1.241	.180	.171	-.446	.341
vi. I develop novel and useful ideas that could benefit my hospital.	145	2.84	1.152	1.328	.196	.171	-.588	.341
Valid N (listwise)	145							

Source: SPSS Research Output, 2026

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Table 5: Descriptive Statistics for Worker's Idea Implementation

Statement	N	Range	Mean	Std. Dev.	Variance	Skew. Stat.	Skew. SE	Kurt. Stat.	Kurt. SE
i. I put the new ideas I generate into practice in my work.	145	4	3.69	1.203	1.448	-.480	.171	-.757	.341
ii. I champion new ideas so that they are accepted within my unit.	145	4	3.73	1.102	1.214	-.615	.171	-.391	.341
iii. I make effort to secure the support and resources needed to implement new ideas.	145	4	3.31	1.077	1.161	-.263	.171	-.655	.341
iv. I transform creative ideas into useful applications in my work processes.	145	4	2.79	1.123	1.260	.120	.171	-.540	.341
v. I encourage and work with colleagues to implement new ideas.	145	4	3.22	1.190	1.415	-.018	.171	-.860	.341
vi. I ensure that innovative ideas are embedded into everyday work routines.	145	4	3.22	1.112	1.236	-.045	.171	-.610	.341
Valid N (listwise)	145								

Source: SPSS Research Output, 2026

As revealed in Tables 2 to 5, the descriptive statistics disclose a generally moderate and, in places, sub-optimal pattern of technological adoption and innovative behaviour among the healthcare workers surveyed, when read against the five-point scale midpoint of 3.00. For technological infrastructure, the item means ranged from 2.54 to 3.82, with reliable internet and connectivity (mean = 3.82) and the maintenance and upgrading of facilities (mean = 3.50) being the stronger elements and the availability of information systems and software (mean = 2.54) the weakest. Technological utilisation clustered modestly between 2.84 and 3.02, worker's idea generation between 2.54 and 3.02, and worker's idea implementation comparatively higher, between 2.79 and 3.73. Across the four constructs, the skewness statistics fell within the conventional threshold and the largely negative kurtosis values indicate broadly spread, platykurtic distributions consistent with a multi-cadre hospital workforce, thereby satisfying the distributional assumptions for the PLS-SEM estimation.

4.3 Measurement Model Evaluation

The measurement model was evaluated to confirm the validity and reliability of the constructs before testing the hypotheses. In line with Hair et al. (2014) and Henseler et al. (2015), the study assessed indicator reliability, internal consistency reliability, convergent validity and discriminant validity. Hulland (1999) recommends an outer-loading threshold of 0.70, noting that a squared loading should yield an indicator reliability of at least 0.50; a minimum Cronbach's alpha and composite reliability of 0.70 (Nunnally & Bernstein, 1994) and an average variance extracted (AVE) of at least 0.50 (Fornell & Larcker, 1981) were adopted as the reliability and convergent-validity cut-off points. The measurement model is presented in Figure 1.

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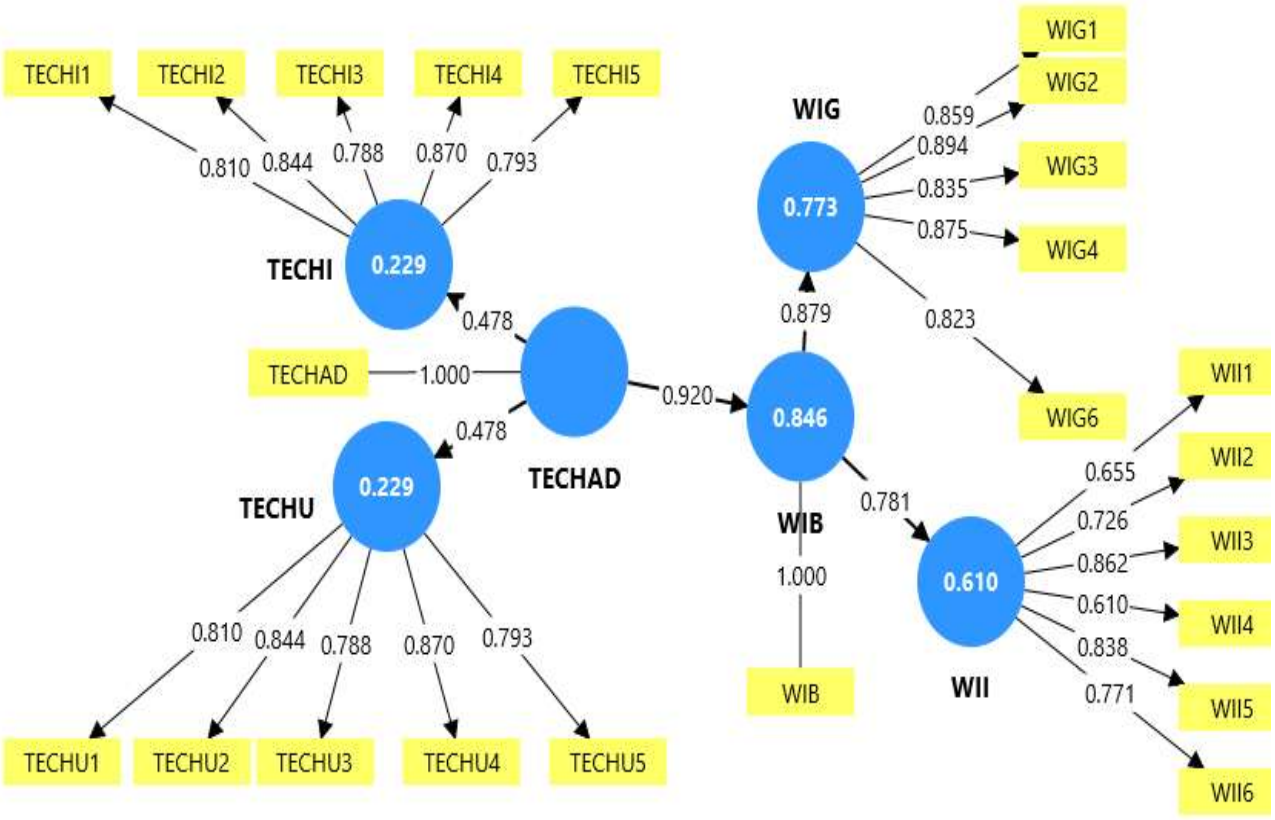

Figure 1: Measurement (Outer) Model.

Source: SmartPLS 4.1.1.9 Output of Research Data, 2026.

Table 6: Result Summary for the Reflective Measurement Model

Construct	Indicator	Loading (β)	Indicator Reliability ($β^2$)	AVE	Composite Reliability (rho_c)	Cronbach's Alpha (α)
Thresholds		>0.70	>0.50	>0.50	>0.70	0.70-0.90
Technological Infrastructure	TECHI1	0.810	0.656	0.675	0.912	0.881
	TECHI2	0.844	0.712			
	TECHI3	0.788	0.621			
	TECHI4	0.870	0.757			
	TECHI5	0.793	0.629			
	TECHI6	deleted	deleted			
Technological Utilisation	TECHU1	0.810	0.656	0.675	0.912	0.881
	TECHU2	0.844	0.712			
	TECHU3	0.788	0.621			
	TECHU4	0.870	0.757			
	TECHU5	0.793	0.629			
	TECHU6	deleted	deleted			
Worker's Idea Generation	WIG1	0.859	0.738	0.735	0.933	0.910
	WIG2	0.894	0.799			
	WIG3	0.835	0.697			
	WIG4	0.875	0.766			
	WIG5	deleted	deleted			

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	WIG6	0.823	0.677			
Worker's Idea Implementation	WII1	0.655	0.429	0.561	0.883	0.858
	WII2	0.726	0.527			
	WII3	0.862	0.743			
	WII4	0.610	0.372			
	WII5	0.838	0.702			
	WII6	0.771	0.595			

Source: SmartPLS 4.1.1.9 Output of Research Data, 2026

As presented in Figure 1 and Table 6, five indicators were retained for technological infrastructure after TECHI6 was deleted, with loadings from 0.788 to 0.870, an AVE of 0.675, composite reliability of 0.912, and Cronbach's alpha of 0.881; technological utilisation, after the deletion of TECHU6, posted loadings from 0.788 to 0.870, an AVE of 0.675, composite reliability of 0.912, and Cronbach's alpha of 0.881; worker's idea generation, after the deletion of WIG5, recorded loadings from 0.823 to 0.894, an AVE of 0.735, composite reliability of 0.933, and Cronbach's alpha of 0.910; and worker's idea implementation retained all six indicators, with WII1 (0.655) and WII4 (0.610) falling marginally below the 0.70 benchmark, yet the construct's AVE of 0.561, composite reliability of 0.883, and Cronbach's alpha of 0.858 met the required thresholds. The model therefore demonstrated satisfactory convergent validity and internal consistency across all four constructs, affirming that the retained indicators adequately represented their latent constructs.

Table 7: Discriminant Validity (Fornell-Larcker Criterion)

	TECHI	TECHU	WIG	WII
TECHI	0.821			
TECHU	0.482	0.821		
WIG	0.428	0.428	0.857	
WII	0.422	0.422	0.774	0.849

Source: SmartPLS 4.1.1.9 Output. Diagonal values are the square roots of the AVE; off-diagonals are inter-construct correlations.

Table 8: Discriminant Validity (Heterotrait-Monotrait Ratio, HTMT)

	TECHI	TECHU	WIG	WII
TECHI				
TECHU	0.499			
WIG	0.458	0.458		
WII	0.398	0.398	0.738	

Source: SmartPLS 4.1.1.9 Output of Research Data, 2026

Discriminant validity was confirmed using both criteria. Under the Fornell-Larcker criterion (Table 7), the square root of each construct's AVE along the diagonal exceeded its correlations with the other constructs, the largest inter-construct correlation being 0.774 between worker's idea generation and worker's idea implementation. This is reinforced by the more stringent HTMT results (Table 8), where every ratio, the highest being 0.738, fell below the conservative 0.85 threshold recommended by Henseler et al. (2015). The four constructs are therefore established as empirically distinct, confirming the discriminant validity of the measurement model.

4.4 Structural Model and Test of Hypotheses

Having established the adequacy of the measurement model, the structural model was estimated to test the four hypothesised relationships through bootstrapping in SmartPLS 4.1.1.9. Following Cohen (1988), path coefficients of 0.10 to 0.29, 0.30 to 0.49, and 0.50 to 1.0 denote weak, moderate and strong relationships respectively, and for the two-tailed test, t-values greater than 1.96 and p-values less than 0.05 denote significance (Hair et al., 2014). The structural model with p-values is presented in Figure 2, the model with t-values in Figure 3, and the summary of hypotheses testing in Table 9.

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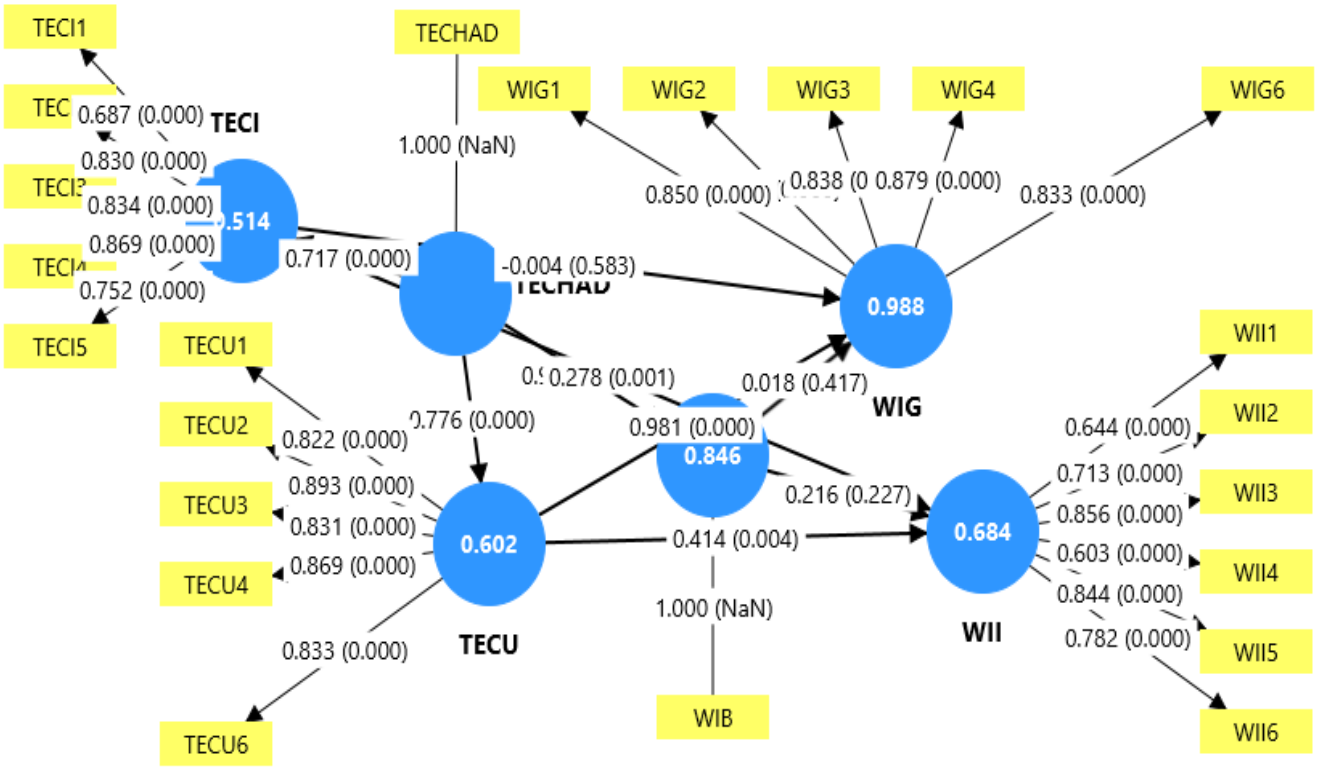

Figure 2: Structural Model showing the beta values and p-values.
Source: SmartPLS 4.1.1.9 Output of Research Data, 2026.

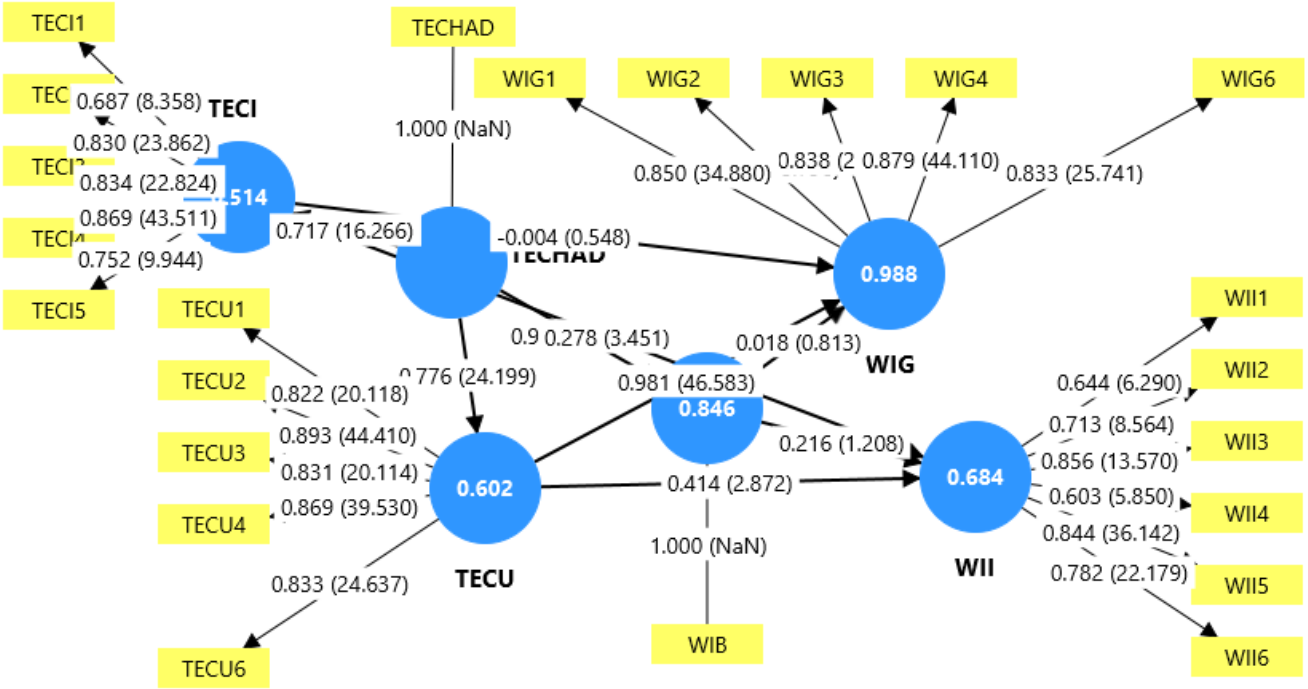

Figure 3: Structural Model showing the beta values and t-values.
Source: SmartPLS 4.1.1.9 Output of Research Data, 2026.

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Table 9: Summary of Hypotheses Testing (Total Effects)

Hypothesised Relationship	Path Coefficient (β)	Standard Deviation (STDEV)	T-statistics (|O/STDEV|)	P-values	Decision on Null Hypothesis
TECHI -> WIG	-0.004	0.008	0.548	0.583	Supported (Accepted)
TECHI -> WII	0.278	0.080	3.451	0.001	Not Supported (Rejected)
TECHU -> WIG	0.981	0.021	46.583	0.000	Not Supported (Rejected)
TECHU -> WII	0.414	0.144	2.872	0.004	Not Supported (Rejected)

Source: SmartPLS 4.1.1.9 Output. One null hypothesis was supported (accepted); three were not supported (rejected). TECHI = Technological Infrastructure; TECHU = Technological Utilisation; WIG = Worker's Idea Generation; WII = Worker's Idea Implementation.

4.6 Interpretation of Results and Discussion of Findings

Ho1: Technological Infrastructure and Worker's Idea Generation

The first null hypothesis (Ho1) states that there is no significant relationship between technological infrastructure and worker's idea generation of teaching hospitals in Rivers State. The finding revealed that technological infrastructure has a negligible, negative and non-significant relationship with worker's idea generation, and the null hypothesis is therefore accepted, the PLS-SEM results returning a path coefficient (β) of -0.004, a t-value of 0.548, and a p-value of 0.583. The implication is that the mere provision and availability of hardware, software platforms and network connectivity does not, of itself, stimulate the front-end, cognitive work of generating new ideas; a plausible reason is that ideation is driven less by the existence of technological assets than by whether those assets are actually engaged, so that infrastructure which sits idle or confined to routine administrative functions supplies neither the informational stimulus nor the cognitive latitude from which fresh ideas arise, a reading consistent with this study's descriptive evidence that the availability of information systems was among the weakest infrastructure items. This finding was, to a degree, surprising, since much literature associates infrastructure with innovative behaviour, yet it is intelligible once availability is distinguished from use. It diverges from Carvalho et al. (2023), who reported a positive and significant digital-infrastructure effect on innovative work behaviour ($\beta = 0.242$, $p < 0.001$), and from Nassani et al. (2024) and Anser et al. (2021), whose infrastructure capabilities significantly predicted innovative work behaviour; the divergence is instructive, for those studies examined innovative behaviour as an undifferentiated whole, whereas the present study isolates the front-end ideation stage, at which the marginal contribution of mere infrastructure appears nil. Theoretically, the finding does not support the naive availability premise sometimes read into the Diffusion of Innovations Theory, but it is consistent with the deeper logic of the Technology Acceptance Model, which insists that it is actual, perceived-useful use, and not the bare existence of technology, that yields behavioural outcomes.

Ho2: Technological Infrastructure and Worker's Idea Implementation

The second null hypothesis (Ho2) states that there is no significant relationship between technological infrastructure and worker's idea implementation of teaching hospitals in Rivers State. The finding revealed that technological infrastructure has a weak, positive and significant relationship with worker's idea implementation, and the null hypothesis is therefore rejected, the results yielding a path coefficient (β) of 0.278, a t-value of 3.451, and a p-value of 0.001. The implication is that, unlike the origination of ideas, the implementation of ideas is materially aided by the availability of infrastructure, since workers seeking to embed, trial and routinise a new idea draw upon the concrete hardware, systems and connectivity that make execution feasible; the significant yet only weak magnitude plausibly reflects that implementation also depends on authority, budgets and managerial support that lie beyond the infrastructure itself. This finding was expected and is theoretically coherent, aligning with the conceptual argument that infrastructure is a stronger enabler of the back-end work of implementation than of the front-end work of ideation. It agrees with Carvalho et al. (2023), whose digital-infrastructure path significantly predicted innovative work behaviour, and with Nassani et al. (2024) and Anser et al. (2021), who established that infrastructure capabilities significantly enable innovative work behaviour. Theoretically, it supports the Diffusion of Innovations Theory, in that the presence and routinisation of an innovation aid its implementation within the social system of the hospital, and it is equally consistent with the Technology Acceptance Model.

Ho3: Technological Utilisation and Worker's Idea Generation

The third null hypothesis (Ho3) states that there is no significant relationship between technological utilisation and worker's idea generation of teaching hospitals in Rivers State. The finding revealed that technological utilisation has a very strong, positive and significant relationship with worker's idea generation, and the null hypothesis is therefore rejected, the results returning a path coefficient (β) of 0.981, a t-value of 46.583, and a p-value of 0.000. The implication is profound: the actual, active use of the technology available

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to hospital workers is overwhelmingly the most powerful driver of their capacity to generate new ideas; a plausible reason is that genuine use continually exposes workers to data, comparative practice, and problem cues that constitute the raw material of ideation, whereas colleagues who do not use the systems remain starved of this stimulus. The finding was expected in direction, though the magnitude of the coefficient is striking, and it powerfully vindicates the study's central argument that utilisation, rather than availability, is the operative mechanism. It agrees strongly with Zhang et al. (2023), who found information-and-communication-technology use to significantly and positively influence innovative job performance ($\beta = 0.139$, $p < 0.05$), with Zhou et al. (2024), who established that the actual use of technology is significantly associated with innovative behaviour, and with Wang et al. (2025), who reported that engagement with digital technology significantly facilitated innovative behaviour. Theoretically, it provides emphatic confirmation of the Technology Acceptance Model, whose logic culminates in actual system use as the proximate determinant of beneficial outcomes, and it is consistent with the use-and-implementation stages of the Diffusion of Innovations Theory.

Ho4: Technological Utilisation and Worker's Idea Implementation

The fourth null hypothesis (Ho4) states that there is no significant relationship between technological utilisation and worker's idea implementation of teaching hospitals in Rivers State. The finding revealed that technological utilisation has a moderate, positive and significant relationship with worker's idea implementation, and the null hypothesis is therefore rejected, the results yielding a path coefficient (β) of 0.414, a t-value of 2.872, and a p-value of 0.004. The implication is that the active use of technology not only sparks ideas but also materially assists workers in carrying those ideas through to implementation, since routine use provides the practical competence, process visibility and operational channels through which ideas can be trialled and scaled; the moderate rather than very strong magnitude plausibly reflects that implementation additionally depends on managerial approval, resource allocation and departmental cooperation. This finding was expected and is theoretically consistent, agreeing with Zhou et al. (2024) and Zhang et al. (2023), who established that the actual use of technology significantly enhances innovative behaviour and innovative job performance respectively, and with Wang et al. (2025), who found that engagement with digital technology significantly promotes innovative behaviour. Theoretically, it supports the Technology Acceptance Model, in that actual system use translates into the behavioural realisation of ideas, and it aligns with the implementation and confirmation stages of the Diffusion of Innovations Theory.

5.0 CONCLUSION

This study examined the relationship between technological adoption and worker's innovative behaviour of teaching hospitals in Rivers State, with technological adoption operationalised through technological infrastructure and technological utilisation, and worker's innovative behaviour proxied by worker's idea generation and worker's idea implementation. The findings collectively establish that it is the actual utilisation of technology, and not its mere availability, that constitutes the decisive driver of innovative behaviour in the sector. Technological infrastructure, on its own, bore no significant relationship with worker's idea generation and only a weak, though significant, relationship with worker's idea implementation, whereas technological utilisation exhibited a very strong relationship with idea generation and a moderate relationship with idea implementation, both significant. The study therefore concludes that technological adoption is a consequential antecedent of worker's innovative behaviour in teaching hospitals in Rivers State, but that its innovative dividends are realised almost entirely through the intensity and quality of technology use rather than through the possession of technological assets; infrastructure sets the ceiling of what is possible, but utilisation determines what is actually achieved.

5.1 Recommendations

Arising directly from the four findings, the following recommendations are proffered:

1) Flowing from the finding that technological infrastructure bore no significant relationship with worker's idea generation, the management and boards of teaching hospitals in Rivers State should deliberately pair every infrastructural investment with structured idea-stimulation mechanisms, so as to convert dormant technological capacity into active ideation. This should be achieved by establishing hospital innovation forums, digital suggestion platforms, and periodic data-review sessions in which staff are guided to interrogate the information generated by hospital systems and surface improvement ideas, ensuring that the presence of technology is translated, through purposeful engagement, into a genuine stimulus for new ideas.
2) Given that technological infrastructure had a weak but significant relationship with worker's idea implementation, the hospital management, information-technology directors and heads of department should strengthen, maintain and continuously upgrade the hospital's technological infrastructure to furnish workers with the reliable means required to carry ideas through to execution. This should be done by ring-fencing recurrent budgetary provision for the servicing, replacement and expansion of hardware, software and network facilities, and by instituting a maintenance and uptime regime that keeps systems dependable when workers move to implement ideas.
3) Flowing from the finding that technological utilisation had a very strong and significant relationship with worker's idea generation, the management and unit heads of teaching hospitals in Rivers State should place the maximisation of everyday technology use at the centre of their innovation strategy, so as to unlock the powerful ideation dividend that active use produces. This should be accomplished by embedding the use of hospital digital systems into standard operating procedures, providing sustained hands-on

training and user support, removing the barriers that push staff back to manual routines, and recognising and rewarding competent, intensive use of the systems across all cadres.

4) Based on the fact that technological utilisation had a moderate and significant relationship with worker's idea implementation, the executive leadership and departmental managers of teaching hospitals in Rivers State should deepen the integration of technology use into the implementation phase of innovation, so as to ensure that generated ideas are actually delivered into practice. This should be done by aligning technology use with the workflows through which ideas are trialled and institutionalised, monitoring usage against implementation outcomes, and pairing utilisation with the managerial approval and resource support that implementation additionally requires.

5.2 Contributions to Knowledge

i. This study makes an original contribution by empirically disaggregating technological adoption into technological infrastructure and technological utilisation, and worker's innovative behaviour into idea generation and idea implementation, and then modelling all four resulting relationships simultaneously with PLS-SEM in the previously unexamined context of teaching hospitals in Rivers State.

ii. The study contributes the empirical discovery that mere technological infrastructure does not drive idea generation and only weakly aids idea implementation, whereas technological utilisation is the overwhelmingly dominant driver of both, thereby advancing knowledge beyond the prevailing tendency to treat the availability of technology as sufficient, and establishing utilisation as the operative mechanism linking technology to innovation in resource-constrained healthcare settings.

iii. The study extends and contextualises the Diffusion of Innovations Theory and the Technology Acceptance Model to the Nigerian teaching-hospital environment, furnishing empirical confirmation that it is the acceptance-and-use logic of the Technology Acceptance Model, rather than the bare presence of an innovation, that best explains innovative behaviour among healthcare workers.

5.3 Suggestions for Further Research

I. Future research should investigate the factors that convert technological infrastructure into active utilisation, and the conditions under which infrastructure translates into idea generation, by introducing potential mediating and moderating variables such as digital competence, user training, perceived usefulness, management support and organisational culture, so as to explain why infrastructure alone failed to drive ideation in the present study.

II. Given that the present study employed a cross-sectional survey design, future research should adopt a longitudinal design that tracks the same teaching hospitals across multiple periods, thereby enabling the establishment of temporal and causal directionality between technological adoption and worker's innovative behaviour and revealing how improvements in utilisation translate into innovation gains as institutional capability matures.

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