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Abstract

This study examined the effect of digitalization on commercialization of research output among universities in Nairobi County, Kenya. It was guided by Diffusion of Innovation Theory and used a positivist philosophy with an explanatory cross-sectional survey design. The target population comprised 4,166 academic staff in 11 universities. A sample of 365 was selected through proportionate stratified sampling by university and simple random sampling within the strata. Of the questionnaires distributed, 320 were returned; after screening for missing data and outliers, 307 usable responses remained, giving a valid response rate of 84.1%. Data were collected using a structured five-point Likert-scale questionnaire. Expert review, principal component analysis and internal-consistency testing supported measurement quality. Findings from regression showed that digitalization was a statistically significant negative predictor. The study concludes that although universities have substantially embraced digitalization, increased digitalization alone does not necessarily translate into improved commercialization of research output and may remain ineffective where complementary commercialization capabilities are weak. The study recommends that universities should integrate digital technologies with stronger intellectual property management, industry linkages, commercialization expertise, market-assessment mechanisms and innovation-support systems to ensure that digital investments contribute to improved commercial outcomes from research.

Keywords: *Commercialization of Research Output; Digitalization; Technology Transfer; Universities*

1. Introduction

Commercialization of university research refers to the process of transforming academic knowledge, inventions and expertise into products, services, licences, start-up firms, consultancy services and research contracts that create social and economic value. It is a central component of the university's third mission because it extends academic activities beyond teaching and publication to the practical application of research findings (Compagnucci & Spigarelli, 2020). However, research commercialization is a complex process. It requires the early identification of market opportunities, protection of intellectual property, proof-of-concept development, access to finance, strong industry relationships and continuous interaction between researchers and potential users. Weaknesses at any of these stages may prevent valuable research from progressing beyond journal articles, reports and institutional repositories.

Digitalization may help universities overcome some of these barriers. Digital research-management systems can improve the visibility of research projects, inventions and academic expertise. Institutional repositories can enable potential investors and industry partners to identify relevant technologies, while virtual collaboration platforms can strengthen interaction between researchers, firms and other stakeholders. Digital tools can also support grant management, market intelligence, data sharing, intellectual-property tracking and the monitoring of research portfolios. However, digital transformation involves more than replacing paper-based records with electronic systems. It requires coordinated changes in technology, institutional processes, employee skills and organizational structures (Verhoef et al., 2021). When these elements are properly aligned, digital systems can reduce information-search costs, improve coordination and accelerate commercialization activities. When they are poorly integrated, they may create additional procedures without improving the commercial value of research.

Digitalization has become a major global trend that is changing how organizations create, deliver and capture value. It has received considerable attention from both researchers and practitioners because of its growing influence on business activities, institutional processes and society (Reis et al., 2018; Schallmo et al., 2020; Tihinen et al., 2016). Despite this growing interest, terms such as digitization, digitalization and digital transformation are often used interchangeably, although they represent different concepts (Schallmo et al., 2020). Digitization refers to the conversion of analogue information into a digital format, while digitalization refers to the use of digital technologies to improve or redesign organizational activities, processes and relationships.

Digitalization therefore involves the wider integration of digital communication technologies into different areas of organizational and social activity. It may occur at the level of technological infrastructure, organizational processes, business functions, industries and the wider economy and society (Brennen & Kreiss, 2016; Degryse, 2016; Parviainen et al., 2017; Tihinen & Kääriäinen, 2016). At the organizational level, digitalization may influence how information is collected, stored, shared and used, as well as how institutions interact with customers, partners and other stakeholders. In this study, digitalization refers to the application of digital technologies in activities that support the commercialization of university research outputs. These activities include research management, intellectual-property administration, market assessment, communication with industry, knowledge transfer and the monitoring of commercialization projects.

Existing evidence identifies several ways through which digitalization may support research commercialization. However, it does not suggest that increased digitalization automatically results in improved commercialization outcomes. Gbadegeshin (2019) found that digital technologies supported information gathering, opportunity evaluation and formal commercialization activities in life-science firms. Ma and Li (2022) reported that enterprise digitalization strengthened knowledge transfer from universities, although the quality of the organizational relationship between universities and firms remained important. Similarly, Adomako and Nguyen (2024) associated digitalization with greater technology-transfer intensity through improved interorganizational collaboration. In contrast, Ferrer-Serrano et al. (2025) identified a non-linear relationship, showing that countries with very high levels of digitalization did not always achieve the strongest technology-transfer outcomes. These findings indicate that the value of digitalization depends on how effectively digital technologies are integrated with institutional capabilities, commercialization processes and relationships with external partners.

The issue is particularly important in the Kenyan university context. Universities have increasingly adopted online services, digital libraries, institutional repositories, research-management platforms and innovation-support systems. Despite these developments, commercialization through licences, royalties, patents, research contracts and income-generating university–industry collaboration remains limited in many institutions (Commission for University Education, 2023). This situation presents an important practical concern: universities may possess digital infrastructure, yet still experience difficulties in transforming research outputs into commercially valuable products and services. Moreover, much of the existing evidence has been drawn from private firms or universities in higher-income countries and may not fully explain how digitalization influences research commercialization in the Kenyan context. This study therefore examined the effect of digitalization on the commercialization of research outputs among universities in Nairobi County, Kenya.

2. Theoretical Review

The study was anchored in Diffusion of Innovation Theory, developed by Rogers (2003). The theory explains how an innovation is communicated through particular channels over time within a social system. Adoption is shaped by the perceived relative advantage, compatibility, complexity, trialability and observability of the innovation. It also proceeds through knowledge, persuasion, decision, implementation and confirmation, while members of a social system adopt at different rates. Later reviews emphasize that diffusion depends not only on the properties of an innovation but also on networks, implementation support and organizational context (Greenhalgh et al., 2004; Dearing & Cox, 2018).

In this study, digital research tools, e-services, repositories, collaboration portals and grant-management systems are the innovations being diffused. Relative advantage concerns whether these systems reduce search, coordination or transaction costs. Compatibility concerns their fit with research, intellectual-property and technology-transfer routines. Complexity relates to usability and staff capability, while trialability and observability affect whether researchers can test the systems and see successful commercialization outcomes. Communication channels link researchers, university managers, technology-transfer offices and external partners. The university is the social system within which adoption is encouraged, normalized and sustained.

The theory predicts stronger use when digital systems are useful, compatible and visible. It does not, however, imply that adoption itself guarantees commercialization. A repository may

be widely used for publication compliance but poorly connected to patent screening or market discovery. An online service may improve administration without changing industry engagement. Diffusion of Innovation Theory is therefore used here to explain both adoption and the possibility of an implementation gap. It supports the expectation of an effect while directing attention to the quality of institutionalization, not merely the presence of technology.

3. Empirical Review and Hypothesis Development

Digitalization refers to the use of digital technologies and data to improve and redesign organizational processes, interactions and value-creation activities. It goes beyond converting analogue information into digital form because it involves integrating digital technologies into how organizations operate, coordinate activities and create value (Verhoef et al., 2021). At the university level, digitalization may include routine electronic services as well as research-specific systems such as electronic research administration, digital libraries, institutional repositories, online collaboration platforms, research-project monitoring systems, grant-management systems and digital innovation or incubation platforms. These technologies can support research commercialization by increasing the visibility of inventions, improving communication between researchers and external partners, strengthening documentation of intellectual property, facilitating identification of potential investors and licensees, and reducing delays in moving research from development to external engagement. However, technology alone is unlikely to produce commercialization outcomes unless it is supported by complementary organizational processes and capabilities for intellectual-property management, market assessment, contracting, partner engagement and business-model development (Parida et al., 2019; Verhoef et al., 2021).

Gbadegeshin (2019), using case studies of high-technology firms in the Finnish life-sciences sector, found that digitalization improved information sourcing and management, technology assessment, formal commercialization activities and the routinization of commercialization processes. Digitalization therefore supported not only communication but also the organization and coordination of activities required to move technologies toward the market. Nevertheless, the study focused on private firms operating within the life-sciences industry, which limits direct generalization to universities whose commercialization processes are influenced by academic incentives, institutional policies and public accountability requirements. Thus, while the study demonstrates the potential contribution of digital technologies to commercialization, university-specific empirical evidence remains important.

Ma and Li (2022) examined Chinese enterprises with postdoctoral workstations and established that digitalization positively influenced the transfer of knowledge from universities to enterprises. Their findings further showed that the quality of postdoctoral workstations mediated this relationship, indicating that digital technologies generate stronger knowledge-transfer outcomes when appropriate organizational interfaces connect universities with firms. This finding is particularly important for university commercialization because research results normally require interaction among researchers, technology-transfer offices, industry partners, investors and other users before they can be converted into licences, products, services or commercial contracts. Digitalization may therefore improve commercialization by strengthening these interfaces rather than merely increasing the availability of technology.

Adomako and Nguyen (2024), using data from 211 firms in Vietnam, found that digitalization positively influenced interorganizational collaboration, which subsequently increased technology-transfer intensity. They further established that collaboration mediated the

relationship between digitalization and technology transfer, while the commercialization potential of the technology strengthened the collaboration–technology-transfer relationship. These findings indicate that digital technologies may contribute to commercialization by enabling organizations to communicate, coordinate activities and exchange knowledge more effectively across organizational boundaries. In universities, research repositories, online innovation portals, partner databases and collaborative platforms may consequently become more valuable when they allow potential licensees, investors, government agencies and industry partners to identify, assess and advance research technologies through coordinated processes.

Laudien and Pesch (2019) found that digitalization changed the design of service-firm business models rather than merely automating existing activities. Similarly, Parida et al. (2019) concluded that technological adoption alone is insufficient for organizations to capture value from digitalization and that business-model innovation is required to align value creation, value delivery and value capture. Applied to university commercialization, this suggests that installing digital repositories, grant systems or research-management platforms may improve efficiency and visibility without necessarily increasing patents, licences, consultancy contracts or research income. Commercial benefits are more likely to arise when universities simultaneously clarify commercialization responsibilities, strengthen incentives, improve decision-making processes and develop effective mechanisms for engaging industry and other external partners.

Ferrer-Serrano et al. (2025), using data from 411 Horizon Europe collaborative projects involving 2,890 organizations across 31 countries, found that countries with intermediate levels of digitalization were more central and effective within technology-transfer networks than some of the most highly digitalized countries. The study further identified connectivity, human capital and integration of digital technologies as important factors associated with countries' positions within technology-transfer networks. The findings suggest that digitalization does not operate in a simple linear manner. Digital investment may produce limited commercialization outcomes when technology adoption advances more rapidly than the development of human capabilities, collaboration networks and institutional processes required to use the technology effectively.

The literature indicates that digitalization can enhance commercialization through improved information management, research visibility, university–industry knowledge transfer, interorganizational collaboration and more efficient commercialization processes. However, the strength of this relationship depends on complementary institutional capabilities, human capital, collaboration arrangements and mechanisms for capturing value. More importantly, evidence from Kenya remains limited regarding the direct effect of digitalization on commercialization outcomes. Existing Kenyan studies have mainly examined commercialization models and patenting practices, intellectual-property policies and awareness, institutional structures, university–industry linkages, and strategic leadership rather than isolating the contribution of digitalization to commercialization performance (Amenya & Wekesa, 2025; Kibii et al., 2026; Siringi, 2022). Consequently, there remains inadequate empirical evidence on whether digitalization improves tangible commercialization outcomes such as royalties, research-generated revenue, commercial contracts, patents, consultancy income and industry-generated income among universities in Nairobi County, Kenya. The present study addresses this contextual and empirical gap by testing the following hypothesis:

H1: Digitalization has statistically significant effect on commercialization of research output among universities in Nairobi County, Kenya.

4. Research Methodology

The study adopted a positivist philosophy and an explanatory cross-sectional survey design. The design was appropriate for estimating the statistical association between digitalization and commercialization at one point in time.

Sampling

The target population comprised 4,166 academic staff from 11 universities in Nairobi County: four public and seven private universities. The university was the unit of analysis, while academic staff were the unit of observation because they participate in research, innovation, consultancy and engagement with external stakeholders. Using the population and a five-percent precision level, a sample of 365 was determined following the finite-population approach described by Yamane (1967). The sample was allocated proportionately across the 11 universities. Simple random sampling was then applied within each university stratum so that eligible academic staff had a known chance of selection. This procedure preserved representation across institutions while supporting respondent-level analysis.

Data collection and measurement

Primary data were collected in 2025 using a structured, closed-ended questionnaire. Items were rated on a five-point scale. Digitalization captured digital strategy, online services, usability and updating of e-services, timely digital information, research-data tools, publication platforms, access to digital libraries, repositories, research-project monitoring, researcher collaboration, digital incubation and grant tracking. Commercialization captured realized income or royalties, revenue from research outputs, financially beneficial research contracts, industry collaboration, commercialization funding, patents, research-linked consultancy, monetizable conference or expo outcomes and payment from commercial publishing outlets. Gender, age bracket and job tenure were included as control variables.

The questionnaire was reviewed for content relevance and clarity. Construct validity was assessed using principal component analysis (PCA), the Kaiser–Meyer–Olkin measure and Bartlett’s test of sphericity. Varimax rotation was used to improve interpretability, and retained items had loadings of at least .500. Internal consistency was evaluated using Cronbach’s alpha, with .700 used as the minimum acceptable benchmark (Hair et al., 2019). Participation was voluntary, no names were requested, and responses were treated as confidential and used for academic purposes.

Data analysis and model specification

Questionnaires were screened for completeness and outliers before analysis. Frequencies and percentages described the respondents, while means and standard deviations summarized the study constructs. Pearson’s correlation assessed the bivariate relationship. Multiple linear regression estimated the conditional association between digitalization and commercialization after controlling for gender, age and job tenure. Regression assumptions were assessed before hypothesis testing. The estimated model was:

$$CRO_i = \beta_0 + \beta_1 \text{Gender}_i + \beta_2 \text{Age}_i + \beta_3 \text{Job tenure}_i + \beta_4 \text{Digitalization}_i + \varepsilon_i$$

where CRO is commercialization of research output, β_0 is the intercept, β_1 – β_4 are regression coefficients and ε is the error term. Statistical significance was evaluated at $\alpha = .050$. Because the study was cross-sectional and observational, the term effect refers to the regression estimate specified in the study; causal conclusions are not claimed.

5. Results

Response rate and sample characteristics

A total of 365 questionnaires were distributed and 320 were returned, an initial response rate of 87.7%. Thirteen returned questionnaires were removed during data cleaning because of missing information or outlier concerns. The final analysis therefore used 307 cases, representing 84.1% of the distributed questionnaires. Table 1 shows that 53.4% of respondents were men and 46.6% were women. The largest age group was 41–50 years (44.3%), and most respondents had worked in their university for more than 10 years (59.6%). This profile indicates substantial institutional experience in the sample.

Table 1. Sample Characteristics (n = 307)

Characteristic	Category	Frequency	Percent
Gender	Male	164	53.4
	Female	143	46.6
Age	Below 30 years	35	11.4
	31–40 years	74	24.1
	41–50 years	136	44.3
	51–60 years	51	16.6
	Above 60 years	11	3.6
Years in university	Less than 1 year	23	7.5
	1–5 years	34	11.1
	6–10 years	67	21.8
	More than 10 years	183	59.6
Years in department	Less than 1 year	23	7.5
	1–5 years	57	18.6
	6–10 years	83	27
	More than 10 years	144	46.9

Commercialization of research output

The findings indicate that commercialization of research output was generally low across all nine retained indicators, with an overall composite score of (Mean = 2.380, SD = 1.330), suggesting that universities had limited success in converting research outputs into tangible financial and market outcomes. Among the individual indicators, industry collaboration that produced income-generating products or services recorded the highest score (Mean = 2.510, SD = 1.580), followed closely by the presentation of monetizable research at sponsored conferences or innovation expos (Mean = 2.500, SD = 1.650) and research-linked consultancy that generated income (Mean = 2.470, SD = 1.590). These findings suggest that universities were relatively more active in collaborative, promotional and consultancy-related

commercialization activities, although the mean scores remained low and therefore indicate that such activities were not widespread. Research contracts that provided direct financial benefits recorded (Mean = 2.400, SD = 1.510), while securing funding or investment to commercialize innovations recorded (Mean = 2.400, SD = 1.540), indicating limited success in attracting external financial resources and translating research agreements into direct institutional benefits. Similarly, patenting research ideas with the intention of earning financial returns recorded (Mean = 2.350, SD = 1.590), while receiving payments or honoraria from commercial publishing outlets recorded (Mean = 2.340, SD = 1.550). The extent to which research outputs directly generated revenue for universities or departments was also low (Mean = 2.280, SD = 1.430). The lowest-rated indicator was royalties received from university inventions that had been licensed or sold (Mean = 2.140, SD = 1.370), suggesting that relatively few research outputs had progressed to advanced stages of commercialization where intellectual property generates direct financial returns through licensing or sale. Overall, the results reveal that commercialization among the universities was characterized more by limited engagement in activities such as industry collaboration, consultancy, research contracting and innovation exhibitions than by the realization of substantial market and financial outcomes such as royalties, investment, licensing income and direct research-generated revenue. This pattern suggests that although universities may have undertaken activities that create opportunities for commercialization, these activities had not consistently translated into measurable financial returns, indicating a gap between the generation and promotion of research outputs and their successful conversion into commercially valuable products, services and intellectual property.

Table 2. Commercialization indicators and measurement results

Indicator	Mean	SD	Loading
Royalties from a university invention that was licensed or sold	2.140	1.370	0.639
Research outputs generated revenue for the university or department	2.280	1.430	0.735
Research contracts provided direct financial benefits	2.400	1.510	0.909
Industry collaboration produced income-generating products or services	2.510	1.580	0.899
Funding or investment was secured to commercialize an innovation	2.400	1.540	0.922
A research idea was patented with an intention to earn returns	2.350	1.590	0.905
Research-linked consultancy generated income	2.470	1.590	0.922
Monetizable research was presented at sponsored conferences or expos	2.500	1.650	0.922
Payment or honoraria were received from commercial publishing outlets	2.340	1.550	0.913
Composite commercialization	2.380	1.330	—

Note. PCA retained one component (eigenvalue = 6.784), explaining 75.379% of variance; KMO = .907; Bartlett's $\chi^2(36) = 3223.351$, $p < .001$; Cronbach's $\alpha = .958$.

Digitalization

The findings indicate that the level of digitalization among the universities was generally high, with an overall composite score of (Mean = 4.050, SD = 0.840), suggesting that respondents perceived their institutions as having widely adopted digital technologies and platforms to support administrative, academic and research-related activities. Among the individual indicators, the availability of a wide range of online services recorded the highest score (Mean = 4.320, SD = 0.940), followed by alignment of the digital strategy with the university mission (Mean = 4.280, SD = 0.970) and the use of digital tools to track research funding and grant applications (Mean = 4.180, SD = 1.100). Respondents also reported that e-services were generally user-friendly and accessible (Mean = 4.160, SD = 1.070), while digital incubation platforms were perceived to support innovation (Mean = 4.140, SD = 1.120) and e-services were continuously updated and improved (Mean = 4.110, SD = 1.110). The availability of a digital repository for storing and sharing research outputs and the use of digital platforms to support researcher collaboration both recorded relatively high scores (Mean = 4.050, SD = 0.960) and (Mean = 4.050, SD = 1.110), respectively, indicating that digital infrastructure was also being used to facilitate knowledge sharing and research interaction. Digital tools supporting research data collection recorded (Mean = 3.960, SD = 1.070), while digital platforms used to manage research publications recorded (Mean = 3.940, SD = 0.950) and access to digital libraries and databases recorded (Mean = 3.910, SD = 1.000). Digital systems for monitoring ongoing research projects were rated slightly lower (Mean = 3.880, SD = 1.190), while the provision of timely information through digital platforms recorded the lowest mean among the indicators (Mean = 3.680, SD = 1.000). Overall, the findings demonstrate that universities had established a relatively strong digital environment characterized by accessible online services, strategic alignment, digital research support, collaboration platforms, repositories, innovation-support systems and grant-tracking tools. However, the comparatively lower scores for timely information provision and monitoring of ongoing research projects suggest that some aspects of digital integration may still require improvement, particularly in ensuring that digital systems provide current information and support effective tracking of research activities. The high overall level of digitalization therefore indicates that the universities possessed substantial digital infrastructure and capabilities that could potentially support research commercialization, although the extent to which these digital resources translate into actual commercialization outcomes requires further empirical examination.

Table 3. Digitalization Indicators and Rotated Component Loadings

Indicator	Mean	SD	loading
Digital strategy aligns with the university mission	4.280	0.970	0.684
A wide range of online services is available	4.320	0.940	0.930
E-services are user-friendly and accessible	4.160	1.070	0.739
E-services are continuously updated and improved	4.110	1.110	0.725
Digital platforms provide timely information	3.680	1.000	0.625
Digital tools support research data collection	3.960	1.070	0.845
Digital platforms manage research publications	3.940	0.950	0.703
Researchers can easily access digital libraries and databases	3.910	1.000	0.746
A digital repository stores and shares research outputs	4.050	0.960	0.527
Digital systems monitor ongoing research projects	3.880	1.190	0.545
Digital platforms support researcher collaboration	4.050	1.110	0.742
Digital incubation platforms support innovation	4.140	1.120	0.829
Digital tools track research funding and grant applications	4.180	1.100	0.817
Composite digitalization	4.050	0.840	

Note. PCA eigenvalues were 8.391 and 1.035; cumulative variance = 72.502%; KMO = .919; Bartlett's $\chi^2(78) = 3688.091$, $p < .001$; Cronbach's $\alpha = .954$. Component labels are based on the content of the retained items. Source: Survey data (2025).

Correlation analysis

The correlation analysis presented in Table 4 shows that digitalization had a statistically significant negative relationship with commercialization of research output ($r = -.250$, $p < .01$). The magnitude of the correlation was small to moderate, indicating that higher reported levels of digitalization were associated with lower levels of realized commercialization outcomes among the sampled universities. This finding is notable because the descriptive results showed that digitalization was generally high, while commercialization remained comparatively low, suggesting that greater availability and use of digital systems had not necessarily translated into stronger financial and market outcomes from university research. The negative association may imply that some universities had invested substantially in digital platforms, e-services, repositories, collaboration tools and research-support systems without achieving corresponding gains in royalties, research revenue, licensing, investment, consultancy income or other commercialization outcomes.

Table 4. Correlation Between Digitalization and Commercialization

Variable	Commercialization of research output	Digitalization
Commercialization of research output	1	
Digitalization	-.250**	1

. ** $p < .01$ (two-tailed)

Hypothesis test

The regression analysis was conducted to determine the effect of digitalization on commercialization of research output while controlling for gender, age and job tenure. Based on the reported results, the overall regression model was statistically significant, $F(4, 302) = 45.025$, $p < .001$, with a multiple correlation coefficient of $R = .654$ and a coefficient of determination of $R^2 = .428$. This indicates that digitalization together with the control variables explained 42.8% of the variation in commercialization of research output, while the adjusted $R^2 = .418$ shows that the model retained substantial explanatory power after adjusting for the number of predictors included. Digitalization had a negative and statistically significant coefficient ($\beta = -.603$, $p < .001$), indicating that, holding gender, age and job tenure constant, a one-unit increase in the measured digitalization score was associated with a .713-unit decrease in the expected commercialization score. This finding suggests that the high levels of digitalization reported by respondents had not translated into higher realized commercialization outcomes and, instead, universities reporting greater digitalization tended to record lower commercialization scores after accounting for the control variables. Among the control variables, job tenure had a negative and statistically significant coefficient ($\beta = -.250$, $p = .015$), indicating that differences in respondents' length of service were significantly associated with reported commercialization outcomes. Gender ($\beta = -.055$, $p = .246$) and age bracket ($\beta = .086$, $p = .154$) were not statistically significant predictors of commercialization. Consequently, the null hypothesis that digitalization has no statistically significant effect on commercialization of research output among universities in Nairobi County, Kenya, was rejected. The results therefore provide evidence of a statistically significant negative relationship between digitalization and commercialization after controlling for respondents' gender, age and job tenure. However, the negative coefficient should not be interpreted to mean that digitalization inherently reduces commercialization; rather, it may indicate that investments in digital infrastructure and platforms have not yet been effectively integrated with complementary capabilities such as intellectual property management, industry engagement, commercialization expertise, funding mechanisms and market-oriented processes needed to convert research outputs into measurable commercial return.

The null hypothesis was therefore rejected: digitalization had a statistically significant effect on commercialization of research output among universities in Nairobi County. The sign must be retained in interpretation. The result does not show that digital technology inherently damages commercialization. It shows that, within this cross-sectional sample and the specified control model, higher scores on the measured digitalization construct were associated with lower commercialization scores.

Table 5. Regression of Commercialization on Digitalization

	B	SE	β	t	p
Constant	5.61	0.324	—	17.299	<.001
Gender	-.146	0.125	-0.055	-1.162	0.246
Age bracket	0.117	0.082	0.086	1.428	0.154
Job tenure	-.351	0.143	-0.250	-2.454	0.015
Digitalization	-.713	0.054	-.603	-13.296	<.001
Model summary					
R	0.654	R^2	0.428	Adjusted R^2	0.418
SEE	1.015	$F(4, 302)$	45.025	Model p	<.001

6. Discussion

The study reveals a clear digitalization–commercialization paradox. Universities were rated highly on digital strategy, e-services, repositories, collaboration tools, research systems and grant tracking, yet reported low royalties, patents, contracts, research revenue and industry-generated income. The significant negative correlation and regression coefficient indicate that the presence and use of general digital systems did not correspond to stronger realized commercialization in the sampled institutions. The result is consistent with the view that adoption and value capture are distinct stages of digital transformation (Parida et al., 2019; Verhoef et al., 2021).

Diffusion of Innovation Theory helps explain this distinction. The high mean suggests that many digital practices have diffused across university operations. However, compatibility with commercialization routines may be incomplete. A research repository can have relative advantage for storage and scholarly visibility while remaining disconnected from invention disclosure, patent assessment, market validation or partner due diligence. Similarly, digital collaboration can be widely available without clear responsibility for moving a promising output through licensing or enterprise development. Diffusion at the level of tools therefore does not establish institutionalization at the level of commercialization outcomes.

The finding differs in direction from Gbadegeshin (2019), Ma and Li (2022), and Adomako and Nguyen (2024), whose studies generally identified positive digital mechanisms for commercialization or technology transfer. Context provides one explanation. Those studies emphasized commercialization stages, enterprise interfaces or interorganizational collaboration, whereas the present scale included both broad university e-services and research infrastructure. High scores may therefore reflect administrative and academic digital maturity more strongly than commercialization-specific maturity. The weak score for timely digital information also points to an operational gap even where platforms are available.

The result is closer to the conditional account advanced by Laudien and Pesch (2019) and Ferrer-Serrano et al. (2025). Digital investments must be joined to business-model design, capable people, connectivity and process integration before they reliably improve transfer outcomes. Rapid or fragmented implementation may also create parallel databases, duplicate reporting, inconsistent ownership records or weak external access. These explanations are plausible but were not directly tested in the present model. They should be treated as interpretations to guide subsequent research, not as established mediators of the observed coefficient.

The strengthened negative coefficient after demographic controls may also reflect unmeasured institutional differences, measurement composition or suppression effects. For example, institutions investing most heavily in digitalization may be responding to historically weak commercialization, creating an inverse cross-sectional pattern. Self-reported perceptions and common-source measurement add further caution. A longitudinal, multilevel design with objective indicators would be needed to determine whether digital integration improves later licensing, contracting or start-up performance. The present evidence nonetheless shows that universities should evaluate digitalization by commercialization outcomes, not deployment alone.

7. Conclusions

The study concludes that digitalization is a statistically significant predictor of commercialization of research output among universities in Nairobi County, but the observed relationship is negative. Digitalization was rated high while commercialization was rated low, and the adjusted regression coefficient remained negative after controlling for gender, age and job tenure. The null hypothesis of no significant effect was rejected.

The main conclusion is therefore not that universities should reduce digitalization. Rather, general digital adoption is insufficient when systems are not aligned with the full commercialization pathway. Digital value is realized when research records, intellectual-property decisions, market evidence, funding, external collaboration and performance monitoring form a coherent workflow. The results identify alignment and integration as the central managerial and research problem.

8. Recommendations

Theoretical implications

Diffusion of Innovation Theory should be applied beyond initial adoption. Future models should distinguish availability, use, compatibility, integration and value realization. Researchers should test whether technology-transfer capability, digital skills, interorganizational collaboration, commercialization culture or business-model innovation mediate the relationship. A non-linear specification should also be considered because benefits may depend on digital maturity and complementary capabilities.

Policy implications

University and higher-education policy should define interoperability standards for research, intellectual-property and commercialization systems. Institutional policies should require a clear digital pathway from project registration and invention disclosure to assessment, protection, partner engagement, contracting and outcome reporting. Funding criteria should reward functioning integration and measurable transfer outcomes rather than the acquisition of stand-alone platforms. Appropriate privacy, cybersecurity and access controls should be built into this pathway.

Managerial implications

University managers should audit existing platforms against each stage of commercialization. Research-management systems should connect to technology-transfer or intellectual-property offices, market-intelligence resources, incubators and partner-facing portals. Each opportunity should have a responsible owner, defined decision points and visible progress indicators. Training should combine digital-system use with invention disclosure, intellectual-property management, market validation, licensing and industry engagement.

Dashboards should track outcomes such as screened disclosures, protected inventions, partner enquiries, proof-of-concept projects, licence agreements, research contracts, consultancy income and time taken between stages. Universities should also improve the timeliness of information on digital platforms, the lowest-rated digitalization item. These measures can shift attention from platform availability to commercialization performance.

Further research

Further studies should use longitudinal data to separate digital investment from later commercialization outcomes and should include objective institutional indicators. Multilevel analysis could distinguish individual perceptions from university-level systems. Qualitative case studies should investigate why highly digitalized universities may record weak commercialization and identify where workflows break down. Replication beyond Nairobi County and comparison of public and private universities would improve generalizability. Future work should also test curvilinear effects and mediators such as technology-transfer capability, collaboration quality, digital readiness and commercialization culture.

References

- Adomako, S., & Nguyen, N. P. (2024). Digitalization, inter-organizational collaboration, and technology transfer. *The Journal of Technology Transfer*, 49(4), 1176–1202. <https://doi.org/10.1007/s10961-023-10031-z>
- Compagnucci, L., & Spigarelli, F. (2020). The third mission of the university: A systematic literature review on potentials and constraints. *Technological Forecasting and Social Change*, 161, 120284. <https://doi.org/10.1016/j.techfore.2020.120284>
- Dearing, J. W., & Cox, J. G. (2018). Diffusion of innovations theory, principles, and practice. *Health Affairs*, 37(2), 183–190. <https://doi.org/10.1377/hlthaff.2017.1104>
- Ferrer-Serrano, M., Fuentelsaz, L., & Gil-Lamata, M. (2025). More digitalization does not always imply more technology transfer: An analysis within the Horizon Europe strategy. *The Journal of Technology Transfer*, 50(2), 419–445. <https://doi.org/10.1007/s10961-024-10104-7>
- Gbadegeshin, S. A. (2019). The effect of digitalization on the commercialization process of high-technology companies in the life sciences industry. *Technology Innovation Management Review*, 9(1), 49–63. <https://doi.org/10.22215/timreview/1211>
- Greenhalgh, T., Robert, G., Macfarlane, F., Bate, P., & Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic review and recommendations. *The Milbank Quarterly*, 82(4), 581–629. <https://doi.org/10.1111/j.0887-378X.2004.00325.x>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage.
- Kibii, S. K. (2025). Strategic leadership, organizational agility and commercialization of research output among universities in Nairobi County, Kenya [Thesis]. Moi University.
- Laudien, S. M., & Pesch, R. (2019). Understanding the influence of digitalization on service firm business model design: A qualitative-empirical analysis. *Review of Managerial Science*, 13(3), 575–587. <https://doi.org/10.1007/s11846-018-0320-1>
- Ma, Y., & Li, B. (2022). Effect of digitalization on knowledge transfer from universities to enterprises: Evidence from postdoctoral workstation of Chinese enterprises. *Technology in Society*, 71, 102102. <https://doi.org/10.1016/j.techsoc.2022.102102>
- Parida, V., Sjödin, D., & Reim, W. (2019). Reviewing literature on digitalization, business model innovation, and sustainable industry: Past achievements and future promises. *Sustainability*, 11(2), 391. <https://doi.org/10.3390/su11020391>

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.

Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889–901.
<https://doi.org/10.1016/j.jbusres.2019.09.022>

Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper & Row.