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Electronic Resources Sharing and Academic Collaborations in Private Universities: A Comparative Study of Ghana, South Africa, and Egypt

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Abstract

This study evaluates and compares the extent to which electronic resource sharing enhances academic collaboration in private universities across Ghana, South Africa, and Egypt, with a focus on ICT capacity, governance frameworks, and collaborative practices. A quantitative cross-sectional survey was conducted with 355 respondents from private universities in Ghana, South Africa, and Egypt. Data were collected via structured questionnaires and analyzed using descriptive and comparative statistics to examine ICT capacity, resource-sharing practices, and academic collaboration. With an average performance score of 54%, South African universities lead the way in ICT infrastructure, whereas Egypt and Ghana have scores of 38% and 27%, respectively. With an average involvement rate of 58%, South Africa once again led the way in collaborative practices, while Egypt and Ghana came in second and third, at 41% and 37%, respectively. In South Africa, formal academic collaborations were more common, including co-authorships (SA: 70%, GH: 50%, EG: 55%) and cooperative research (SA: 75%, GH: 60%, EG: 65%). Compared with Ghana (25%) and Egypt (38%), South Africa had the strongest support for policy and governance (59%), indicating more effective digital strategies and equitable governance frameworks. Notwithstanding these advancements, typical issues, including tight finances, disjointed digital systems, and administrative roadblocks, persist in many countries and are especially severe in Ghana. These findings highlight the necessity of standardized digital regulations, investment in ICT infrastructure, and cooperative governance structures to promote fair academic partnerships. The findings provide actionable insights for university administrators and policymakers on strengthening ICT infrastructure, digital policies, and regional academic partnerships to promote equitable collaboration.

Background

Academic libraries have evolved from traditional information repositories to complex virtual systems designed to meet the ever-expanding information needs of higher education communities in the current digital era. Academic libraries worldwide have been compelled to adopt digital transformation due to the proliferation of digital content, the rapid advancement of information and communication technologies (ICT), and the increasing demand for access to scholarly resources. A key strategy for improving access to scholarly materials, encouraging academic collaboration, and reducing the growing expenses of information resources is, in particular, electronic resource sharing (ERS) (Ankamah, Gyesi, & Amponsah, 2024).

The collaborative use of digital resources by libraries, known as ERS, can bridge geographic distances, expand the variety of academic resources, and provide affordable access to databases, journals, e-books, and other essential scholarly content. Universities and their users can remain competitive in research, education, and learning thanks to these platforms, which make information more accessible (Ankamah et al., 2024).

The optimization of ERS remains a significant obstacle; nevertheless, despite its numerous advantages worldwide, especially for academic libraries in developing nations, such as private universities in Ghana,

South Africa, and Egypt. Private universities in these areas face significant obstacles to achieving full digital integration, particularly in their library systems. Private universities in Ghana, South Africa, and Egypt frequently deal with problems like outdated ICT infrastructure, disjointed resource-sharing networks, a lack of institutional support (Mupaikwa, 2025)., and a lack of strategic alignment between library systems and these institutions' academic goals, even though many public universities have started to adopt ERS models (Odularu & Bokwe, 2025). These limitations make it more difficult for these universities to fully utilize academic collaboration and ERS.

Financial constraints, a lack of institutional management support, and a lack of concerted attempts to create regional resource-sharing networks further exacerbate the situation at many private universities in Ghana, South Africa, and Egypt. There is a dearth of strong, structured mechanisms that facilitate the sharing of electronic resources, and far less attention is paid to encouraging academic cooperation through these platforms, despite some success in establishing informal or ad hoc partnerships across libraries. ERS has received considerable attention in higher education worldwide, with many studies having focused on resource-sharing practices, ICT infrastructure, and institutional policies (Odularu & Bokwe, 2025; Anene & Nancy, 2024). Most of this research has focused on public universities or single-country case studies, often overlooking the complex experiences of private institutions across regions, especially in Africa. To date, there is a significant gap in the literature on the comparative analysis of private universities' engagement in ERS and academic collaborations across diverse African contexts, specifically Ghana, South Africa, and Egypt.

From preliminary research, private university libraries in these countries experience poor patronage and underutilization of their digital resources, even as the availability of electronic resources expands. Outdated ICT systems, inadequate resource-sharing agreements, and a lack of institutional cooperation are blamed for these difficulties. Furthermore, private universities miss out on opportunities for co-authorship, collaborative research, and cross-institutional academic collaboration due to the fragmentation of current resource-sharing programs.

By providing a thorough, comparative investigation of the ERS procedures in private institutions in Ghana, South Africa, and Egypt, this study sought to address these gaps. It specifically examined how these institutions differ and how they are comparable in terms of ICT infrastructure, resource-sharing procedures, and the perceived value of resource sharing for scholarly cooperation. This study aims to provide valuable insights into how enhanced resource-sharing practices can foster academic collaboration in private universities by examining the factors that facilitate and hinder efficient resource sharing.

Findings from this study may help create scalable, sustainable models for resource sharing that strengthen academic networks, increase research output, and ultimately spur innovation in these nations' higher education systems by examining the factors that facilitate or impede efficient ERS. Additionally, by focusing on the specific challenges faced by private universities in these three nations, the study will contribute to the broader conversation about the role of digital platforms in higher

education. It will provide evidence-based suggestions for stakeholders, university administrators, and policymakers to improve academic collaboration and advance these institutions' research and teaching goals by fostering more conducive environments for resource sharing. To support the broader objective of maximizing the sharing of digital resources for academic excellence, this project ultimately seeks to close the gap among policy, practice, and technology integration in private higher education institutions across the African continent.

Theoretical and Conceptual Review

In this study, the adoption and use of e-resources and collaboration require a theory with technology that facilitates e-resource sharing and collaboration. The Unified Theory of Acceptance and Use of Technology (UTAUT2) served as the theory for this study. The UTAUT2 model suggests that the actual use of technology is determined by the effect of four constructs (performance expectancy, effort expectancy, social influence, facilitating condition) from the UTAUT model and three new constructs (hedonic motivation, cost/perceived value, and habit) as predictors of behavioral intention and use behavior. Figure 1 illustrates the UTAUT theory used in the study.

Performance expectancy addresses the perceived benefits or uses of technology for users. When users or tertiary institutions find the e-resources useful, they will adopt and use them. When users or tertiary institutions find the e-resources useful, they will put in more effort to deploy and use the e-resources to manage their repositories and scholarly works. Social influence refers to what other people or colleagues say about the use and benefits of e-resources. That is, to what extent are other users and institutions using e-resources to facilitate the archiving and management of research output. Facilitating conditions in this context refer to tertiary institutions' anticipation of e-resources and the extent to which these resources support scholarly archiving and communication. Hedonic motivation is concerned with the pleasure derived from using e-resources for archiving and communicating research output. E-resources must provide value for money for users and institutions, facilitating the archiving and communication of research output, which is the core mandate of the price-value construct. Lastly, habit concerns the extent to which individuals tend to automatically prefer and adopt e-resources for archiving and communicating research output.

ERS and Collaboration

E-resources are materials that contain information, and their contents are in formats that are accessible and primarily usable through a computer or electronic device, and in some cases require internet connectivity. These e-resources include e-books, electronic journals, CD-ROM/DVDs, electronic theses/dissertations, digital reference materials, electronic dictionaries, electronic articles, electronic encyclopedia, electronic newspapers, electronic magazines, electronic mail, online public access catalog (OPAC), and databases (Antwi & Frimpong, 2020; Dei. 2024). The primary purposes of using and accessing e-resources were to assist with research, projects, teaching, and learning (Antwi & Frimpong,

2020). The sharing of these resources through consortia or interlibrary loan systems enables libraries to extend their services and overcome budgetary constraints (Bawack, 2018).

Different users use e-resources in different ways. The acceptance of using e-resources for research and education is influenced by several factors (Dei, 2024; Antwi & Frimpong, 2020). Several factors, including perceived usefulness and perceived ease of use, influence users' willingness to use e-resources (Dei, 2024). Although there have been some encouraging outcomes, the adoption of e-resources in the academic sector has been and still is fraught with difficulties (Ngo & Eichelberger, 2019). Ankamah et al. (2024) assert that resource sharing is particularly critical for libraries in developing regions like Africa, where funding for electronic resources is often limited.

Beyond the obvious benefits of using shared resources, academic collaboration and ERS also promote creativity, enhance research results, and advance the professional development of both teachers and students (Zamiri & Esmaeili, 2024). Increased research productivity is one of the main advantages, and it results directly from shared access to electronic resources (Rafı, JianMing, & Ahmad, 2019). ERS makes it easier for researchers to access databases, tools, and relevant academic information, thereby speeding up the research process. Shared resources allow researchers to focus more on their work, thereby boosting productivity and accelerating scholarly investigation, according to Nche (2021). By using these tools, researchers may conduct more productive and successful investigations, ultimately increasing academic understanding (Zakaria, 2021).

The research process is enhanced by having access to a wide variety of scholarly electronic resources (Ankamah et al., 2024). According to Wu et al. (2022), researchers may integrate a broader range of viewpoints and findings into their work thanks to shared electronic resources, which yield more thorough and reliable research results (Antwi & Frimpong, 2020). In addition to enhancing research findings, this access to a variety of resources facilitates the development of more sophisticated arguments and solutions, both of which are essential when dealing with intricate, multidisciplinary problems (Owusu-Ansah, 2020).

Sharing resources not only increases the output and caliber of research but also offers substantial cost-saving potential (Nche, 2022). Institutions can jointly negotiate better prices for access to digital resources, thereby lowering the cost of individual subscriptions, by participating in shared consortia or licensing agreements (Nche, 2022; Cuhadar & Cimen, 2019). For private universities with tight finances for purchasing digital materials, this is especially advantageous (Sarma & Munkhbat, 2021). These cooperative agreements make it easier for smaller schools to offer top-notch resources to their academic communities by providing access to a wide range of digital resources without paying for individual subscriptions (Ramasamy & Khan, 2024; Nche, 2022).

Teaching, research, and learning can also benefit from teamwork and resource sharing (Atatsi, Stoffers, & Kil, 2021). Collaborative projects provide faculty members access to a wider variety of instructional resources, which can improve their methods and provide students with a more engaging educational experience (Antwi & Frimpong, 2020). Resource-sharing programs provide students with access to

educational resources that would otherwise be unavailable, fostering a more diverse and equitable learning environment, according to Nche (2022). Students can interact more fully with the course material, perform better academically, and acquire critical research skills by increasing access to educational resources (Ochieng & Gyasi, 2021). Additionally, by sharing resources and information, these partnerships help to build a vibrant and connected academic community that benefits both students and teachers (Wabike, 2021).

Public universities in Ghana, South Africa, and Egypt have made great strides in electronic resource-sharing programs; however, private universities in these nations still face several obstacles that prevent them from fully benefiting from these programs (Ngoc, Hieu, & Tien, 2023). The main obstacles keeping private universities from using the entire spectrum of digital resources accessible to their public counterparts (Sultan & Rafiq, 2021) include lack of funding, a lack of legislative frameworks, and a lack of cooperation across institutions (Owusu-Ansah, 2021). Nonetheless, there is cause for optimism given the growing trend in consortia formation in these nations, as these efforts may help remove some current obstacles and enable private universities to take advantage of ERS (Nche, 2022).

Academic libraries in Ghana, South Africa, and Egypt face both national and regional challenges in exchanging electronic resources, particularly for private universities. These obstacles, which range from inadequate infrastructure to budgetary limitations (Baada et al., 2020), have prevented private institutions from fully engaging in resource-sharing programs (Rahman & Al Mamun, 2024). Private universities frequently struggle to access the same quantity and quality of digital information and to incorporate these resources into their academic procedures (Sultan & Rafiq, 2021), while public universities in all three nations have made significant progress in sharing electronic resources (Raimundo & Rosário, 2021).

The Consortium of Academic and Research Libraries in Ghana (CARLIG), which provides shared access to costly digital resources, has proven beneficial to academic institutions (Ofori & Cobblah, 2024; Nche, 2022). However, a lack of institutional mechanisms for partnerships with public institutions, insufficient funding, and poor ICT infrastructure make it difficult for private universities to gain admission (Ayoung, Baada, & Baayel, 2021).

National consortia, such as the South African Library Consortium (SABINET), which make it easier for academics to access electronic research resources, have also primarily benefited South Africa's academic institutions (Nche, 2022). But like those in Ghana, private universities in South Africa have had trouble gaining access to these resources. Many private institutions rely on individual, sometimes expensive, and dispersed digital content subscriptions because they lack the financial means to participate in these consortia. Although some South African private universities have started to establish their consortia (Uctu & Essop, 2022), these efforts are still in their early stages and are hampered by their narrow focus, the absence of unified policy frameworks, and the lack of long-term sustainability plans (Matebese, Mkhwanazi, & Losi, 2024; Mutsvunguma, 2019).

Similarly, Egypt's public universities, such as Cairo University and Alexandria University, have benefited from national initiatives like the Egyptian Knowledge Bank (EKB), which has significantly enhanced access to electronic resources for higher education (Khalaf, 2022). However, private universities in Egypt have not been able to capitalize on these initiatives due to the high cost of digital resource licenses and limited collaboration with public institutions (El Baradei, 2021).

Methodology

A quantitative, cross-sectional survey approach is employed in this study to investigate how enhanced ERS can enhance academic partnerships between private universities in Ghana, South Africa, and Egypt. The decision to use a quantitative method is based on the necessity of objective measurement, cross-national comparability, and statistical generalization of patterns and correlations (Önder & Ayhan, 2022). Using the research methods and design, a wide range of respondents from the three nations provided standardized data through a comparative descriptive survey. This approach facilitated the collection of numerical data to define existing practices, identify trends, and analyze institutional variations in ERS and their impact on academic collaboration.

The target group included postgraduate students, faculty members, librarians, and ICT personnel affiliated with accredited private universities in the three countries. These participants were selected for their active involvement in academic collaborations and regular use of electronic resources. Institutions and respondents were selected using a purposive sampling technique (Nyimbili & Nyimbili, 2024). From this pool, 355 respondents were selected: 139 from Ghana, 115 from South Africa, and 101 from Egypt. This distribution permits significant cross-country comparisons while guaranteeing balanced representation.

A standardized, self-administered questionnaire served as the primary data-gathering tool and was disseminated electronically via institutional mailing lists, learning management systems (LMS), and WhatsApp groups managed by institutional liaison officers. To ensure that responders with restricted digital access were included, physical copies were occasionally provided and collected in person. The questionnaire was divided into six thematic sections covering: ICT infrastructure for collaboration and resource sharing; strategies and practices for collaboration and resource sharing; type of academic collaboration for resource sharing; policies and governance support for electronic resource sharing; importance of resource sharing for academic collaboration; and challenges in digital infrastructure for academic collaboration. A five-point Likert scale, with 1 indicating "strongly disagree" and 5 indicating "strongly agree," was used to assess respondents' agreement. This response style enabled consistent, quantitative measurement of attitudes and impressions.

The measurement scales were created using previously approved tools from pertinent ERS and higher education research (Nfila & Darko-Ampem, 2020; Igwe, 2021). The items were modified where needed to take institutional and regional circumstances into account. Thirty respondents, ten from each nation,

participated in a pilot study to evaluate the instrument's cultural suitability, clarity, and reliability. Minor adjustments were made to enhance item clarity and reduce ambiguity in response to feedback.

SPSS Version 26 was used for data analysis in this investigation. Data from the six topic areas were compiled using descriptive statistics. To highlight internal variability and national differences, country-specific averages and standard deviations were calculated. To facilitate cross-country comprehension, the results were displayed in comparative tables. To uncover important limitations in the deployment of ERS, open-ended replies on infrastructure issues were also thematically coded. The investigation shed light on the governance frameworks that influence academic partnerships, institutional collaborative practices, and the degree of digital readiness. This enabled the identification of best practices and performance gaps, which served as the foundation for suggestions to improve ERS and promote long-term academic cooperation among private universities across the three countries.

Ethical approval

for this study was obtained from the Institutional Review Board (IRB) of the Center for Research and Graduate Studies, KAAF University (Approval No. IRB-KU/HSS/25/06/21). The study protocol was approved by the IRB in accordance with the University's ethical guidelines for research involving human participants and the ethical principles of the Declaration of Helsinki (2013 revision). All procedures performed in this study complied with the approved ethical protocol and applicable institutional regulations governing research involving human participants.

Findings

This section presents the study's findings. It highlights the demographic information, ICT infrastructure, strategies, types, policies, importance, and challenges of academic collaboration for resource sharing.

Demographic information of respondents

The results show notable cross-country variations in ICT infrastructure, collaborative tactics, and institutional support, based on responses from 355 participants. The findings, organized into six themes, highlight the importance of strong digital infrastructure, effective governance, and inclusive policies in fostering fruitful academic collaborations. See Table 1 for the demographic breakdown of respondents by country.

Table 1
Demographic information of respondents.

Category	Ghana (n = 139)	South Africa (n = 115)	Egypt (n = 101)
Librarians (%)	39%	30%	35%
Faculty Members (%)	38%	45%	33%
ICT Staff (%)	12%	10%	8%
Graduate Students	11%	15%	24%

According to the study, Ghana has the highest percentage of librarians participating (40%), suggesting that resource sharing and library services are more closely related in Ghana. South Africa (30%) seems to rely more on academics than librarians, while Egypt (35%) comes in second. In terms of faculty participation, South Africa has the highest rate (45%), indicating a more robust integration of resource sharing into research and teaching methodologies. Egypt has the highest percentage of graduate-student respondents (24%). Table 2 below details the distribution of ICT infrastructure.

ICT Infrastructure for Collaboration and Resource Sharing

Table 2
ICT Infrastructure for Collaboration and Resource Sharing.

Variable	ICT Infrastructure	Ghana (n = 139)	South Africa (n = 115)	Egypt (n = 101)	Mean/ Average (n = 355)
ICT_B1	Complete Digital System	35%	55%	45%	45%
ICT_B2	ICT Infrastructure Rated Good/Excellent	25%	51%	35%	37%
ICT_B3	Interoperability with other University systems	28%	48%	31%	36%
ICT_B4	Dedicated E-Resources Platform	31%	61%	42%	45%
ICT_B5	Availability of High-Speed Internet	43%	71%	51%	55%
ICT_B6	Integration with International Digital Libraries	20%	45%	32%	32%
ICT_B7	Use of Cloud-Based Academic Tool	22%	52%	38%	37%
ICT_B8	There exists a Centralized Database for Sharing	18%	46%	34%	33%
ICT_B9	Regular Digital Training for Students/Lecturers	25%	58%	42%	42%
ICT_B10	Adequate funding for ICT Infrastructure	22%	51%	37%	37%
Mean		27%	54%	38%	40%
Standard Deviation		7.64	7.87	6.29	6.86

With an average score of 54%, South Africa leads, indicating a more advanced and cohesive digital learning environment. Ghana lags behind at 27%, showing a slower pace of digital transformation in its higher education sector, while Egypt ranks second at 38%. South Africa outperforms other countries in all ten areas, including dedicated e-resource platforms (61%), high-speed internet (71%), and fully digital systems (55%). Ghana has the lowest scores in key categories, including cloud-based technologies (22%), centralized databases (18%), and interaction with foreign digital libraries (20%), highlighting limited availability and interoperability. Egypt continues to make steady progress, especially in cloud tool usage (38%) and internet access (51%). Digital training for lecturers and students is more common in South Africa (58%) than in Egypt (42%) and Ghana (25%). Adequate funding for ICT infrastructure is another major factor, with South Africa again leading at 51%, compared to Egypt's 37% and Ghana's 22%. The standard deviation values 7.64 for Ghana, 7.87 for South Africa, and 6.29 for Egypt indicate some

variability in performance across indicators, with Egypt showing greater consistency. Table 3 outlines the strategies and practices for collaboration and resource sharing.

Strategies and Practices for Collaboration and Resource Sharing

Table 3
Strategies and Practices for Collaboration and Resource Sharing.

Variable	Strategies and Practices	Ghana (n = 139)	South Africa (n = 115)	Egypt (n = 101)	Mean/ Average (n = 355)
STR_C1	Engagement in the sharing process	48%	65%	50%	54%
STR_C2	Utilization of consortium	40%	55%	35%	43%
STR_C3	Informal Sharing Agreement	55%	35%	45%	45%
STR_C4	Use of Centralized Institutional Repositories	32%	60%	40%	44%
STR_C5	Use of Open Access Platforms	58%	75%	62%	65%
STR_C6	Joint Procurement of E-Resources	20%	50%	30%	33%
STR_C7	Staff Participation in Committees for Resource Sharing	28%	63%	41%	44%
STR_C8	Utilization of Shared Cloud Storage Platform	22%	63%	36%	40%
STR_C9	Sharing of common Learning Tools/Platforms	27%	53%	29%	36%
STR_C10	Development of collaborative research	31%	66%	44%	47%
Mean		37%	58%	41%	45%
Standard Deviation		14.32	11.08	10.56	9.44

With an average participation rate of 58%, South Africa leads, demonstrating improved institutional cooperation and effective digital resource sharing systems. Ghana ranks 37%, indicating lower engagement in common digital practices, while Egypt ranks second at 41%. In areas such as staff involvement in resource-sharing committees (63%), the use of centralized repositories (60%), collaborative research (66%), and open-access platforms (75%), South African institutions perform well. Both official and informal sharing activities are supported by this well-coordinated structure. Egypt

shows a moderate level of involvement, characterized by a relatively high use of informal agreements (45%) and open-access platforms (62%), but a lower use of centralized tools and consortia. Ghana has comparatively higher open-access utilization (58%) and informal sharing (55%) but lags behind in committee involvement (28%), cloud storage platforms (22%), and collaborative procurement (20%). South Africa's performance is the most inconsistent across categories, whereas Egypt's performance is steadier, as indicated by the standard deviation values of 10.56, 11.08, and 14.32 for Ghana, respectively. This is shown in Table 4 below.

Type of Academic Collaboration for Resource Sharing

Table 4
Type of Academic Collaboration for Resource Sharing.

Variable	Type of Academic Collaboration	Ghana (n = 139)	South Africa (n = 115)	Egypt (n = 101)	Mean/ Average (n = 355)
TYPE_D1	Joint Research	60%	75%	65%	67%
TYPE_D2	Students' Network	30%	55%	45%	43%
TYPE_D3	Grant Application	25%	60%	40%	42%
TYPE_D4	Co-Authorship	50%	70%	55%	58%
TYPE_D5	Formal Academic Partnership Agreement	20%	58%	35%	38%
TYPE_D6	Shared Access to E-Journals and Databases	18%	65%	40%	41%
TYPE_D7	Availability of Joint Supervisory Committees for Graduate Research	15%	45%	30%	30%
TYPE_D8	Collaborative Curriculum Development	12%	50%	25%	29%
TYPE_D9	Cross-Institutional Faculty Exchange	10%	40%	20%	23%
TYPE_D10	Joint Conferences and Webinars	10%	50%	30%	30%
Mean		25%	58%	39%	40%
Standard Deviation		16.36	11.03	13.05	13.19

With an average collaboration rate of 58%, South Africa significantly leads ahead of Egypt (39%), while Ghana has the lowest mean collaboration rate at 25%. This highlights notable differences in the scope and depth of scholarly cooperation among the three countries. South Africa consistently performs well across all areas, with high participation in collaborative research (75%), co-authorship (70%), and shared

access to e-journals and databases (65%). A robust environment for inter-institutional cooperation is suggested by the well-established student networks, grant proposals, and formal academic alliances. Egypt ranks second with a respectable level of involvement, particularly in co-authorship (55%) and collaborative research (65%). However, participation in more formal collaborations, such as curriculum development and supervisory committees, remains relatively low. Ghana underperforms in formal, structured partnerships such as academic partnership agreements (20%), pooled e-resources (18%), and faculty exchange (10%), but demonstrates relatively strong engagement in cooperative research (60%) and co-authorship (50%). Compared to South Africa's more stable performance (SD = 11.03), Ghana's higher SD of 16.36 indicates considerable variability across the different metrics. Table 5 presents a comparison of institutional and policy support below.

Policies and Governance Support for Electronic Resources Sharing

Table 5
Policies and Governance Support for Electronic Resources Sharing.

Variable	Policies and Governance Support	Ghana (n = 139)	South Africa (n = 115)	Egypt (n = 101)	Mean/ Average (n = 355)
POL_E1	Formal institutional policies supporting e-resource sharing	35%	71%	38%	40%
POL_E2	University leadership involvement in digital collaboration	20%	52%	35%	36%
POL_E3	Governance framework for managing shared digital platforms	25%	60%	41%	42%
POL_E4	An institutional mandate for inter-university collaboration using digital tools	20%	58%	35%	38%
POL_E5	Effectiveness of open access or audit systems for collaborative utilization of e-resources	18%	51%	30%	33%
POL_E6	Performance incentives for faculty/staff engagement in digital collaboration	15%	42%	28%	28%
POL_E7	Policies encouraging open access and shared repositories	58%	75%	62%	65%
POL_E8	Aligned with national ICT or higher education digital strategies	Limited	Strong	Moderate	Moderate
POL_E9	Inclusiveness of policies across departments and campuses	Fragmented	High inclusivity	Uneven	Uneven
POL_E10	Legal/regulatory framework supporting e-resource sharing	Moderate	Strong	Moderate	Moderate
Mean		25%	59%	38%	41%
Standard Deviation		15.41	10.93	11.26	11.88

With an average score of 59%, South Africa again demonstrates the strongest framework, followed by Egypt (38%) and Ghana (25%). This indicates that structural and policy support is limited in Ghana. South Africa benefits from strong formal institutional policies (71%), robust governance frameworks (60%), and

alignment with digital initiatives. Policy inclusion across departments and campuses is high, with university administration playing a key role in promoting cooperation (52%). Egypt faces shortcomings in faculty incentives and leadership involvement but shows moderate overall progress, especially in governance (41%) and regulations supporting open access (62%). Ghana's governing environment is fragmented and underdeveloped. Only 20% of institutions report university leadership participation, and just 15% offer performance incentives for digital collaboration, although 58% have policies supporting open access. The weak or disjointed alignment with national ICT goals and policies reflects the absence of a unified national strategy. Standard deviation scores further highlight variability: South Africa (10.93) and Egypt (11.26) display more consistent implementation, while Ghana (15.41) shows the greatest variability, indicating uneven policies across institutions. Table 6 expounds the importance of resource sharing in academic collaboration

Importance of Resource Sharing for Academic Collaboration

Variable	Importance of Resource Sharing for Academic Collaboration	Ghana (n=139)	South Africa (n=115)	Egypt (n=101)	Mean/ Average (n=355)
IMP_F1	Research projects benefitting from shared resources	31%	68%	42%	47%
IMP_F2	Teaching materials exchanged	25%	62%	39%	42%
IMP_F3	E-Resources supporting joint graduate supervision	18%	53%	33%	35%
IMP_F4	Cross-border faculty collaboration is enabled by a shared tool	22%	58%	36%	39%
IMP_F5	Increased access to international journals via partnership	27%	66%	41%	45%
IMP_F6	Policies supporting e-resource collaboration exist	35%	71%	38%	48%
IMP_F7	Academic program co-developed using shared resources	15%	47%	28%	30%
IMP_F8	Institutional reporting improved research visibility due to the sharing	20%	62%	34%	39%
IMP_F9	Access to shared digital repositories enhances curriculum development	23%	64%	35%	40%
IMP_F10	Use of collaborative platforms for joint academic publications	26%	67%	37%	43%
Mean		24%	62%	36%	41%
Standard Deviation		6.23	6.78	4.37	6.37

Table 6. The Importance of Resource Sharing for Academic Collaboration.

With an average score of 62%, South Africa leads, followed by Egypt (36%) and Ghana (24%). This pattern indicates that academic partnership outcomes in South Africa, moderate participation in Egypt, and relatively low integration in Ghana are strongly linked to effective resource-sharing arrangements. Universities in South Africa see significant benefits from pooling resources, especially in research projects (68%), access to foreign journals (66%), and collaborative academic publications (67%). Additionally, with support from institutional infrastructure and regulations, shared platforms are used efficiently for curriculum development, monitoring, and teaching. Egypt lags behind in curriculum development and supervisory support but makes small gains, particularly in research cooperation (42%)

and access to foreign journals (41%). Ghana, with an average of only 24%, has the lowest figures in nearly every category. Only 35% of respondents report having supporting policies, and even fewer find graduate supervision (18%), research visibility (20%), or co-development of academic programs (15%) beneficial. This low involvement reflects a lack of institutional and strategic focus on resource sharing within the Ghanaian academic environment. The SD values, 6.23 for Ghana, 6.78 for South Africa, and 4.37 for Egypt, suggest similar opinions within each country, with Egypt showing the least variation. Table 7 outlines the challenges in digital infrastructure for academic collaboration across the countries.

Challenges in Digital Infrastructure for Academic Collaboration

S/N	Ghana	South Africa	Egypt
1.	Budget constraints	Licensing restriction	ICT infrastructure gaps
2.	Limited ICT infrastructure	Budget constraints	Staff training issues
3.	Low interoperability with international platform	Institutional data security concerns	Bureaucratic delays in collaboration approval
4.	Inconsistent internet access	Uneven access across provinces	Limited access to up-to-date e-resources
5.	Lack of technical support teams	Administrative bottlenecks in partnerships	Language barriers in accessing global databases
6.	Limited cloud computing adoption	Slow procurement processes	Centralized control over academic systems
7.	Weak policy framework for digital collaboration	Fragmented national digital policy coordination	Inadequate incentives for inter-university collaboration
8.	Low adoption of cloud-based solutions	Limited uptake of shared academic repositories	Slow procurement processes for digital tools
9.	Fragmented database systems	Faculty resistance to digital transition	Unstable funding for digital upgrades
10.	Weak maintenance culture for ICT systems	Gaps in inter-university collaboration protocols	Low integration of digital tools into teaching

Table 7. Challenges in Digital Infrastructure for Academic Collaboration.

Ghana, South Africa, and Egypt face distinct challenges in developing digital infrastructure for academic cooperation, yet they share similar issues, including unequal technology adoption, limited funding, and legislative gaps. Ghana struggles with budget constraints, poor ICT infrastructure, and unstable internet connectivity. These problems are exacerbated by fragmented database systems, poor compatibility with international platforms, and limited adoption of cloud solutions. The potential for collaboration is further limited by weak policy frameworks and insufficient technical support. Despite having advanced systems, South Africa still faces challenges like faculty resistance to digital change, licensing restrictions, and

unequal access across provinces. Additionally, administrative hurdles and disjointed national digital policies hinder the smooth operation of inter-university partnerships. Inefficiencies in implementation are evident through slow procurement processes and limited use of shared academic resources.

Discussion of Findings

ICT Infrastructure for E-Resources Sharing and Collaboration

The results indicate that private universities in Ghana, South Africa, and Egypt have notably different ICT infrastructures for academic collaboration. The consistency of progress, measured by Standard Deviation, shows that Egypt exhibits more consistent advancement across all digital metrics, with the least fluctuation. South Africa and Ghana exhibit somewhat greater variability, suggesting uneven development; some regions may be weaker, while others are quite strong. These differences reflect varying levels of digital maturity, resource allocation, and policy focus, all of which are vital for building a productive academic commons (Suber, 2012).

A logical approach to digital collaboration is demonstrated by South Africa's strong scores in areas such as frequent digital training (58%), dedicated e-resource platforms (61%), and high-speed internet (71%). These patterns are consistent with those reported by Ghosh et al. (2019), who emphasize how strong digital platforms can improve access to academic materials and collaborative tools. The creation of interconnected information ecosystems, a fundamental tenet of UTAUT 2, is further supported by the existence of cloud-based academic tools (52%) and interoperable systems (48%).

Ghana, on the other hand, scored worse in all categories, especially cloud-based tools (22%) and centralized database access (18%), which point to a lack of institutional support and infrastructure constraints. This result is consistent with the findings of Motuma, Alemneh, and Jimma (2024), who highlight how infrastructure deficiencies in African higher education directly impair collaborative skills. Egypt has made modest investments in digital tools, as seen by its reasonable performance; yet, there are still gaps in interoperability (31%) and integration with foreign libraries (32%). According to Ostrom (1990), these discrepancies undermine the collective usefulness of academic e-resources by highlighting unequal access to shared digital assets. The systematic underinvestment in digital infrastructure required to maintain collaboration is further demonstrated by insufficient funding, estimated at just 22% in Ghana and 37% in Egypt.

These results indicate the importance of a strategic, well-funded, and policy-driven approach to ICT infrastructure (Motuma, 2024). To effectively utilize the promise of ERS for academic collaboration, universities must coordinate their digital investments with open systems, interoperable technologies, and inclusive training (Suber, 2012).

Strategies and Practices for Collaboration and Resource Sharing

The findings reflect that different institutions vary in their levels of strategic integration and engagement in fostering academic collaboration. South Africa aligns with worldwide trends that encourage networked scholarship and the collective curation of digital resources. Ghana, on the other hand, appears to have fragmented practices and a lack of defined frameworks. This finding is consistent with research by Tella et al. (2022), which demonstrates that informal methods often hinder scalability and accountability, despite being beneficial in resource-constrained settings. The potential for long-term collaborative knowledge generation is further undermined by the fact that many Ghanaian institutions lack shared platforms and organized repositories (Asubiaro & Onaolapo, 2023).

The use of consortia and centralized repositories remains minimal, although Egypt's performance is mediocre yet promising in terms of open access utilization and collaborative research projects. Inconsistent practices among institutions are reflected in the comparatively high standard deviation reported in previous research by Al-Zahrani and Alasmari (2025), who noted differences in digital adoption within North African higher education systems.

A strong cooperation strategy needs to be institutionalized through formal agreements, cross-border consortia, and open platforms that lower access barriers (Suber, 2012). The digital commons risk fragmenting in the absence of such systems, thereby restricting fair participation and knowledge co-production (Ostrom, 1990). To transform these practices into enduring academic commons throughout the region, it is essential to standardize resource-sharing regulations, foster official collaborations, and invest in interoperable digital platforms (Pantuvo & Oluwarore, 2024).

Type of Academic Collaboration for Resource Sharing

The types of academic collaboration observed in Egypt, South Africa, and Ghana exhibit significant regional differences in the breadth and structure of inter-institutional relationships. Reflecting a range of maturity in collaborative academic ecosystems.

Strong co-authorship (70%), joint research (75%), and shared access to e-journals and databases (65%) are all displayed by South Africa, indicating a system of collaborative scholarly output that is firmly rooted in institutional policies and digital infrastructure (Bikard, Vakili, & Teodoridis, 2019). On the other hand, Ghana's limited participation in cross-institutional faculty exchanges (10%), joint supervisory committees (15%), and formal academic partnership agreements (20%) suggests a limited collaborative atmosphere. The significant degree of variability (standard deviation = 16.36) highlights irregular or haphazard resource-sharing procedures. These findings are consistent with those of Tella et al. (2022), who observe that long-term, meaningful collaboration in many private universities in West Africa is hampered by a lack of institutional incentives and strategic frameworks.

With modest participation in student networks (45%), co-authorship (55%), and joint conferences (30%), Egypt falls into the middle. However, the comparatively low levels of faculty exchanges (20%) and curriculum co-development (25%) indicate institutional and regulatory limitations, including centralized governance systems and bureaucratic control.

Theoretically, these trends suggest that formal agreements, shared infrastructure, and digital platforms that promote fair access are essential for institutionalizing academic collaboration, a fundamental principle of the UTAUT2. Collaboration can become dispersed and exclusive in the absence of deliberate governance measures, as is often the case in South Africa, particularly in resource-constrained settings. To create robust, cross-border knowledge commons that support education and research in Africa, improving collaboration necessitates a combination of structural investments, transnational academic agreements, and inclusive policy frameworks (Asubiaro & Onaolapo, 2023).

Policies and Governance Support for Electronic Resources Sharing

There are differences in the institutional maturity and strategic alignment of the governance architecture for e-resource sharing between private universities in Ghana, South Africa, and Egypt. With the highest mean score and comparatively low variability, South Africa leads the way. This indicates a strong and well-organized policy environment that facilitates digital collaboration. Ghana, on the other hand, exhibits the greatest variability and the lowest mean, indicating that policy implementation is uneven and dispersed across institutions.

The prevalence of systemic enablers that institutionalize digital cooperation is evident in the strong adoption of formal institutional policies, the promotion of open access, and leadership involvement among South African universities. The country's ability to use centralized policy ecosystems to support collaborative access is further strengthened by the close alignment with national ICT and higher education plans.

Ghana, on the other hand, requires strategic transformation, as evidenced by its comparatively weak indices, including low leadership involvement (20%), limited performance incentives (15%), and fragmented policy inclusivity. This bolsters research by Asubiaro and Onaolapo (2023), who contend that e-resource sharing stays fragmented and intermittent in the absence of cross-campus integration and coordinated institutional mandates. Egypt performs poorly on most metrics (mean = 38%), but there are still issues with inter-university mandates (35%) and policy inclusivity, indicating only partial implementation without complete institutional support.

Importance of Resource Sharing for Academic

In every metric, Ghana trails South Africa by an average of 37 percentage points. Egypt still lags behind by almost 24.5 percentage points, indicating moderate but considerable deterioration, despite being better than Ghana. South Africa leads in every way, scoring higher than 50% on each metric. This shows robust policy support, cross-border frameworks, and institutional structures. Some indicators (such as co-developed academic programs) may still require improvement, according to variability. Egypt performs fairly well, with a range of 30–40 percent. Egypt misses South Africa's superior performance but exhibits more balanced improvement. This suggests that, although structural efforts are in place, they may require better coordination or collaboration. Across all metrics, Ghana performs the worst. Notably, there is a lack of graduate supervision and co-development, indicating a deficiency in support and a culture of cooperation. The moderate variation reveals a lack of a systematic strategy and uneven development. According to the findings, which are analyzed using UTAUT 2, facilitating and shared digital platforms, as well as communal access, are essential for promoting research and teaching collaborations in digitally networked academic settings.

With a mean e-resource sharing collaboration score of 62%, South Africa routinely outperformed Egypt and Ghana across all metrics, while Egypt and Ghana scored 36% and 24%, respectively. This implies that South Africa's strategically positioned digital policy and comparatively sophisticated ICT infrastructure foster stronger cross-academic collaboration. These results are consistent with those of Asubiaro and Onaolapo (2023), who observed that curricular innovation and collaborative publication rates are greater at institutions with integrated open-access systems.

South African universities exhibited much greater levels of indicators, including combined graduate supervision (53%), shared teaching materials (62%), and improved access to international journals (66%). This is consistent with the findings of Dei et al. (2024), who discovered that collaboration tools and digital repositories improve academic visibility and promote international collaborations.

Ghana's lower scores, on the other hand, indicate systemic issues, such as a lackluster digital infrastructure, disjointed policy frameworks, and few incentives for cooperation, which are in line with those of Tella et al. (2022). To fully utilize ERS, Egypt's mediocre performance underscores the value of regional governance and the need to decentralize authority over academic systems. The research supports the idea that fair access, inclusive governance structures, and policies aligned with national ICT strategies are necessary for ERS to function as an academic commons.

Challenges in Digital Infrastructure for Academic Collaboration

This comparative study clarifies the several obstacles preventing private institutions in Ghana, South Africa, and Egypt from developing their digital infrastructure and exchanging electronic resources. According to the comparative analysis, financial limitations, policy fragmentation, and low stakeholder participation are similar obstacles, even though the types and magnitudes of difficulties differ among the

three countries. The results highlight the importance of a systems-thinking approach that integrates organizational, technical, and human capital dimensions to maximize academic collaboration and ERS.

Private universities in Ghana exhibited fundamental deficits and fragmented systems for sharing and collaborating on e-resources. Thus, Ghana struggles with severe infrastructure problems, including inadequate ICT infrastructure, unreliable internet connectivity, and limited compatibility with global platforms. Budgetary constraints and a lax policy framework for digital collaboration exacerbate these difficulties. The findings of Kouladoum (2023), which highlight the beneficial relationship between digital infrastructure and inclusive growth in Sub-Saharan Africa, are consistent with such foundational deficiencies. The viability of digital initiatives is further hampered by a weak maintenance culture and a lack of technical support teams (Ostrom, 2007).

South Africa showed policy incoherence and transitional frictions. Private universities in South Africa have more sophisticated digital infrastructure, but they also face transitional challenges such as institutional data security concerns, budgetary constraints, and licensing restrictions. A mismatch between institutional practices and policy frameworks is seen in faculty resistance to the digital transition and the disjointed national coordination of digital policies. These results are consistent with those of Hammond and Burdon (2024), who point out that traditional policies are insufficient to support South Africa's digital transformation.

Operational inflexibilities and centralized control were evident in Egypt's private institutions, which face difficulties stemming from centralized authority over academic systems, lengthy approval processes for collaborations, and restricted access to modern e-resources. Insufficient incentives for inter-university collaboration and problems with staff training exacerbate these operational inflexibilities. This situation supports Kouladoum's (2023) concerns about the need for inclusive, decentralized digital infrastructure development to foster equitable growth.

Limitations and Implications of the Findings

Limitations

The study employed a purposive (non-probability) sampling strategy targeting private universities, which limits the generalizability to public universities. Further studies can include public universities, other comparative analyses, and relationships.

Policy Implications

1. Fragmented Policy Landscape (Ghana, Egypt): Organized academic collaboration is hampered by the lack or insufficiency of official institutional and national regulations facilitating the sharing of e-resources. In the absence of policies, informal or ad hoc arrangements are made.
2. Alignment with National Strategies: The significance of incorporating institutional policies with national digital agendas is demonstrated by South Africa's strong alignment with national ICT and

higher education strategies.
3. Governance Gaps: The need for more robust regulatory monitoring and performance incentives for digital collaboration is highlighted by Ghana and Egypt's inconsistent policy implementation and inadequate governance structures.

Practical Implications

1. Disparities in Infrastructure: The significant disparity in ICT infrastructure quality (mean: 27% in Ghana, 54% in South Africa, and 38% in Egypt) points to unequal academic collaboration capabilities. Digital library access, cloud adoption, and interoperability are all hampered for institutions with poor infrastructure.
2. Operational Constraints: Ghana and Egypt's efficient use of e-resources is hampered by recurring problems such as inadequate cloud-based solutions, bad internet connectivity, and a lack of digital training.
3. Digital Readiness and Adoption: South Africa's cutting-edge approaches (such as open access use, shared cloud storage, and collaborative research) demonstrate how investing in digital technologies results in strong teamwork.

Recommended Model for ERS and Collaboration

A tiered framework, the Model for ERS and Academic Collaborations, was developed to improve inter-university collaboration by implementing supporting strategies and an organized digital infrastructure. It comprises four interrelated layers, each of which supports the others. According to this model, productive academic collaboration requires a multi-layered system in which strategies, policies, and infrastructure all contribute to measurable academic outcomes. It also highlights the need for each layer to be robust so that the subsequent layers work well. See Fig. 2, Electronic Resource Sharing and Collaboration Model (Researchers' proposed model)

1. Strong ICT Infrastructure (Basis Layer)

This forms the foundation of the model and comprises:

a. High-speed internet: Provides constant access to online resources and tools.

b. E-Resources Platforms: Specific platforms for sharing and archiving scholarly materials.

c. Digital Training: Staff and students should get regular training to improve digital literacy.

d. Cloud-based tools make collaboration, retrieval, and storage simple.

e. Interoperability with both domestic and foreign digital libraries is ensured through library integration.

Why it matters: Collaboration efforts are fragmented and ineffective in the absence of a robust digital infrastructure.

2. Framework for Governance and Policy (Enabling Layer)

Structure and supervision for resource sharing are provided by this layer:

a. Institutional Policies: Official rules that facilitate cooperation.

b. Legal and regulatory frameworks: laws that guarantee data security and the protection of intellectual property.

c. Harmonization with regional or national digital strategies is ensured via alignment with ICT strategies.

d. Committees and consortia are cooperative organizations that oversee and coordinate sharing initiatives.

Why it matters: Robust governance and policies lower risks, standardize procedures, and promote involvement.

3. Operational Layer Collaboration Techniques and Strategies

This layer is made up of institutional agreements and practical actions:

a. Open Access Platforms: Knowledge bases that are freely available.

b. Shared Repositories: Academic resources are kept in one place.

c. Joint Procurement: Buying e-resources as a group to cut expenses.

d. Participation in Consortia: Groups established to pool resources and expenses.

e. Committees for Resource Sharing: Organizations that organize sharing activities.

Why it matters: Collaboration becomes regular, methodical, and sustainable thanks to operational techniques.

4. Academic Cooperation (Outcome Layer)

This is the outcome of all underlying work and consists of:

a. Collaborative Research Initiatives

b. Co-authorship and Collaborative Works

c. Applications for Collaborative Grants

d. Graduate Supervisory Committees That Are Shared

Why it matters: These scholarly achievements enhance the caliber, prominence, and institutional influence of research.

Conclusion

While all three countries, South Africa, Egypt, and Ghana, acknowledge the importance of sharing electronic resources for scholarly collaboration, this comparison reveals significant differences in their levels of infrastructure, policy support, and actual implementation. With a relatively high average score and less variation, South Africa consistently outperforms Ghana and Egypt across all categories, signaling a more developed and coordinated digital environment for higher education. Its stronger governance, greater internet access, and use of centralized platforms have facilitated increased faculty participation and richer academic collaborations, including joint research, co-authorship, and shared repositories. Ghana, on the other hand, shows the weakest performance across categories, hampered by fragmented databases, budget limitations, and limited adoption of cloud-based tools. Despite some engagement through informal sharing agreements and open-access initiatives, the absence of formal institutional mandates and digital governance policies significantly hampers its capacity for expanded academic collaboration. Egypt falls between the two, with moderate infrastructure and participation, but facing bureaucratic hurdles and uneven implementation of digital initiatives. Overall, the findings emphasize the urgent need for unified national and institutional strategies that invest in ICT infrastructure, promote inclusive governance, and encourage regional cooperation. The success seen in South Africa offers a scalable model for digital transformation that other African nations can adapt to improve knowledge sharing, research innovation, and academic development.

Declarations

Ethics Approval

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of the Center for Research and Graduate Studies, KAAF University (Approval No. IRB-KU/HSS/25/06/21). The study protocol was approved by the Institutional Review Board in accordance with the University's ethical guidelines for research involving human participants and the ethical principles of the Declaration of Helsinki (2013 revision). All procedures performed in this study complied with the approved ethical protocol and applicable institutional regulations governing research involving human participants.

Consent to Participate

Written informed consent to participate in this study was obtained from all participants prior to data collection. Participants were informed about the purpose of the study, the confidentiality of responses, the voluntary nature of participation, and their right to withdraw at any stage without penalty.

Consent to Publish

All participants gave their consent to the publication of the study's results.

Data Availability

Data supporting this study are available from the corresponding author upon reasonable request.

Originality

This manuscript is our original work and has not been published previously, nor is it under consideration for publication elsewhere in whole or in part.

Funding Declaration

The authors declare no known financial or non-financial competing interests that could have influenced the work reported in this manuscript. This research was supported by the Andrew W. Mellon Foundation under the BECHS-Africa Project. The Andrew W. Mellon Foundation had no role in the study design, data collection, analysis, interpretation, or decision to submit the manuscript for publication.

Accordance Statement

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki (2013 revision), and ethical approval was granted by the Institutional Review Board of the Center for Research and Graduate Studies of KAAF University.

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Figures

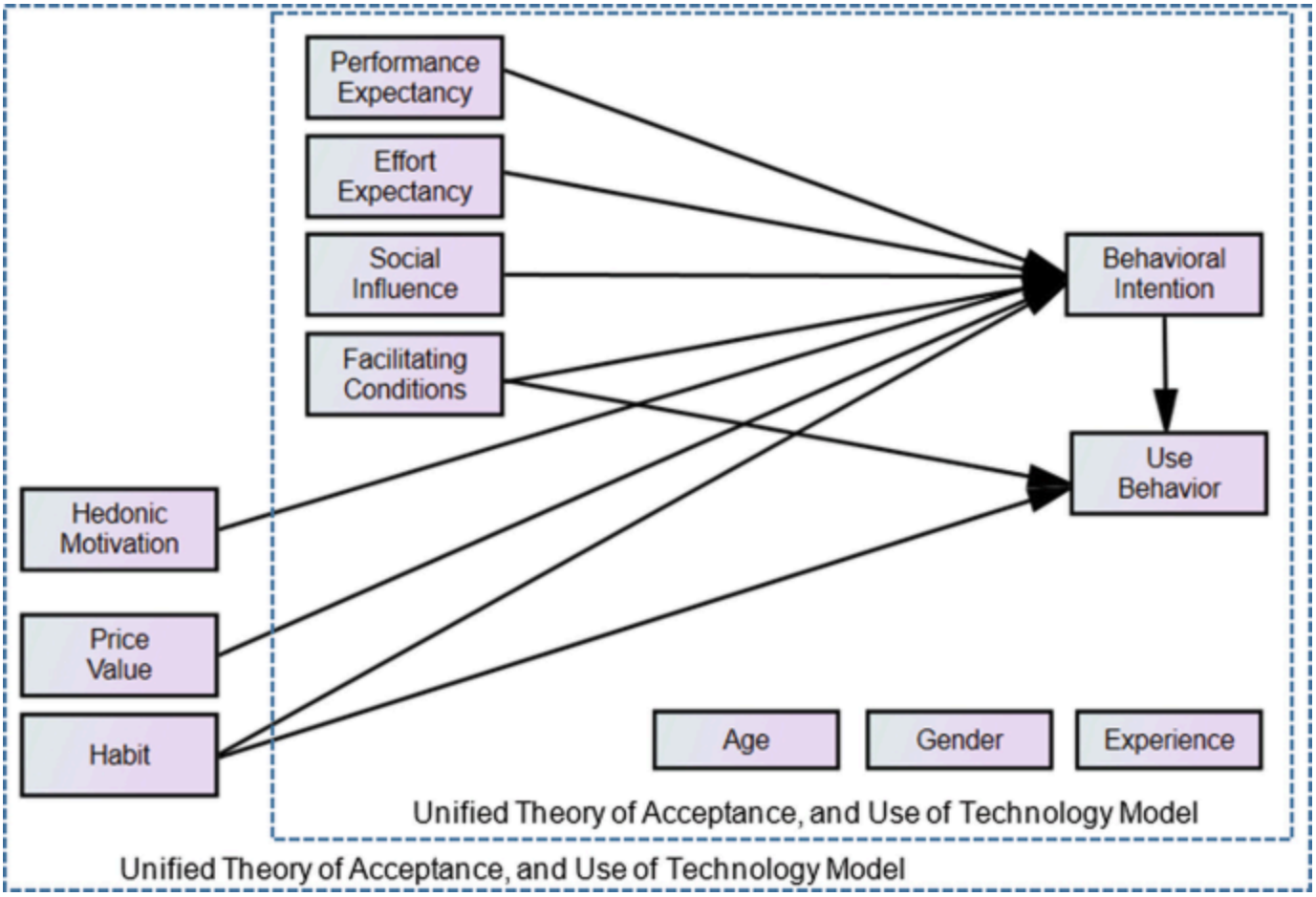


Figure 1

Unified Theory of Acceptance and Use of Technology 2 (Venkatesh, Thong, & Xu, 2012)

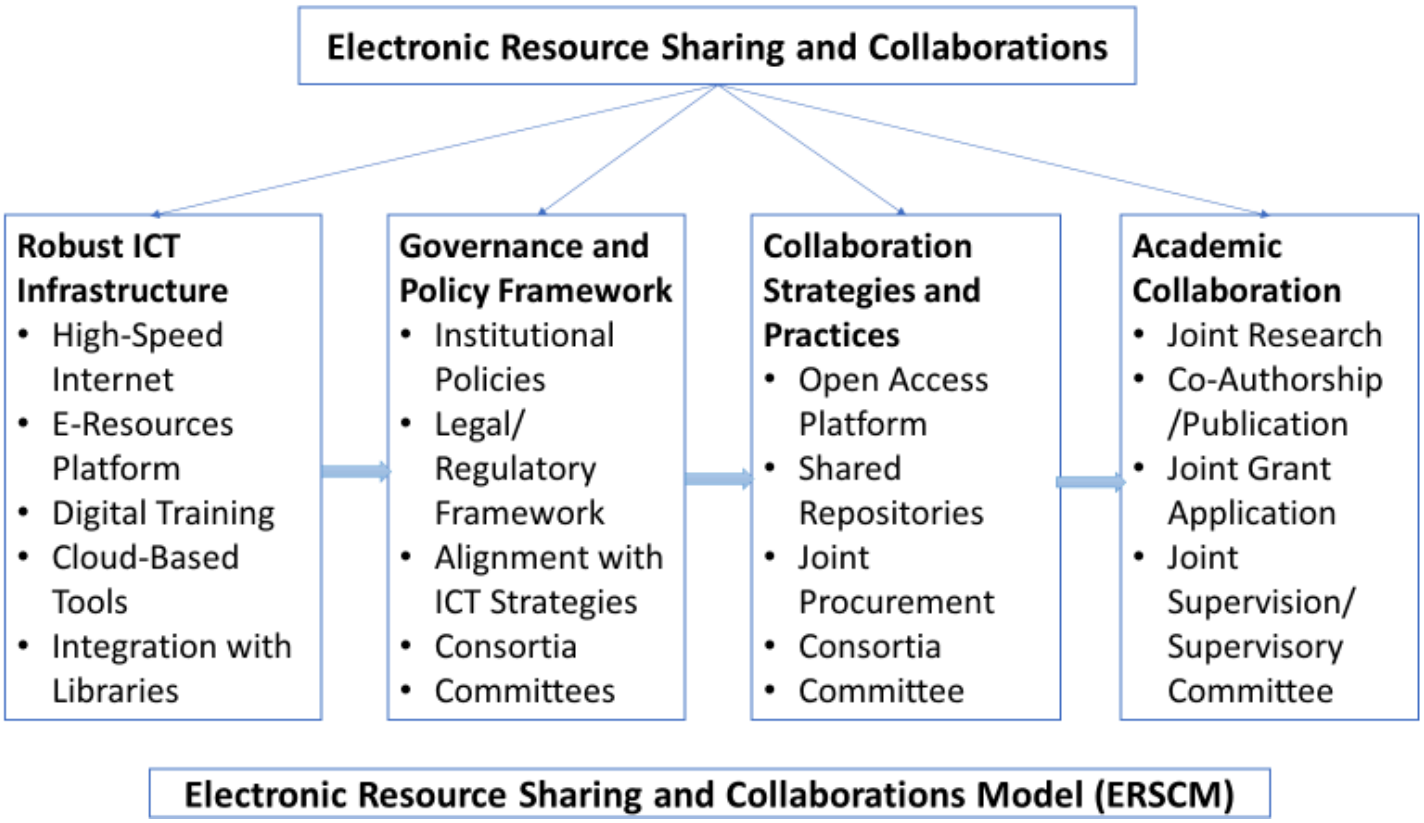


Figure 2

Electronic Resource Sharing and Collaboration Model (Researchers' proposed model)