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JISTaP

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Short-Form Video Affordances and Internship Information Adoption Among Gen Z: An Exploratory TikTok Study

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ABSTRACT

This study examines whether the self-determination theory (SDT)-affordance framework, developed in short-form video health-information research, can explain the intention to adopt internship information in a career-information context. This exploratory TikTok study is situated within an internship-focused creator community. The single-account setting contextualizes the case rather than claiming population-level representativeness. A cross-sectional online survey was conducted among followers of @Baihaqi Hamman | Info Magang in Indonesia (n=422). The Indonesian instrument adapted Song et al.'s SDT-affordance measures from health information to internship information. Relationships among hedonic, utilitarian, and connective affordances, psychological need satisfaction, and internship-information adoption intention were examined using partial least squares structural equation modelling with bootstrapping. The results were consistent with the theorized SDT-affordance pattern. Autonomy, competence, and relatedness satisfaction were positively associated with adoption intention, while each affordance was positively associated with its corresponding psychological need. Relatedness satisfaction showed the strongest association. Descriptive indirect estimates also followed the expected direction but require cautious interpretation because of the exploratory, cross-sectional, single-account design. This study adapts Song et al.'s SDT-affordance framework from health-information adoption to internship-information adoption. It provides context-bound evidence from one creator community and develops propositions for future multi-creator, multi-platform, and cross-cultural research. The study relied on a convenience sample, self-reported intention, and a cross-sectional practitioner-researcher setting. Therefore, it indicates theoretical consistency rather than causal or population-level generalizability.

Keywords: Generation Z, internship information, self-determination theory, media affordances, short-form video, TikTok

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1. INTRODUCTION

Internships are widely recognized as an important bridge between education and employment because they help students develop work-relevant skills, build realistic career expectations, and experience professional socialization. In Indonesia, this emphasis is reflected in the Merdeka Belajar–Kampus Merdeka program, which encourages students to learn not only in formal classroom settings but also in authentic work environments (CNN Indonesia, 2021). Demand for internship opportunities remains high. In the fourth cohort of Magang Merdeka, 25,952 participants were selected from 79,769 applicants, indicating that many students still needed access to relevant opportunities and reliable placement information (Yunita, 2023).

At the same time, Generation Z increasingly encounters career information through digital and mobile environments, rather than relying only on formal university channels. Social media platforms now function not merely as spaces for entertainment and interaction, but also as everyday information environments where users discover opportunities, interpret requirements, compare advice, and decide whether to act. This shift is important because internship discovery depends not only on exposure to vacancy information. It also depends on whether users perceive the information as understandable, useful, credible, and actionable enough to adopt.

Short-form video (SFV) platforms, including TikTok, Instagram Reels, and YouTube Shorts, have become particularly relevant in this context. Their combination of visual narration, algorithmic distribution, comment-based interaction, and rapid circulation allows practical information to be presented in concise and engaging forms. During and after the COVID-19 period, video-based information practices also became increasingly normalized in learning, support, and community settings (Hiebert & Kortes-Miller, 2023). On TikTok, this broader shift has enabled the emergence of internship-oriented creators who package deadlines, eligibility requirements, application tips, and motivational messages in formats that are faster, more accessible, and more affectively engaging than conventional vacancy boards.

To explain why some SFV content may move users from exposure to adoption intention, this study draws on self-determination theory (SDT) and the affordance perspective. SDT argues that autonomy, competence, and relatedness are basic psychological needs that support motivated engagement (Deci & Ryan, 1985; 1987; Ryan & Deci, 2020). In an information context, autonomy refers to users' sense of self-directed choice, competence refers to their perceived ability to understand and act on information, and relatedness refers to their sense of being socially connected, supported, or acknowledged. The affordance perspective, meanwhile, focuses on the action possibilities that a technological environment makes available to users (Gibson, 1979; Norman, 1988; Zhao et al., 2013). In SFV environments, these affordances may include enjoyable presentation, practical usability, and opportunities for social interaction.

This study is directly informed by Song et al. (2021; 2022)'s TikTok-based health-information research, which integrated SDT and the affordance perspective. Their work suggests that SFV affordances may support psychological need satisfaction, which is then associated with information adoption. This model provides a useful theoretical foundation for examining internship information because users do not simply encounter career-related content. They must also decide whether the information is worth saving, sharing, discussing, or acting upon. However, internship information differs from health information in its institutional, temporal, and career-related stakes. Users often need to evaluate deadlines, eligibility, application procedures, and perceived fit. This makes the career-information context a meaningful setting in which to examine whether the SDT-affordance pattern remains visible.

The present article examines this issue through one specific empirical case: the internship-focused TikTok account @Baihaqi Hamman | Info Magang. Because the data are drawn from a convenience sample within one creator community, this study is positioned as an exploratory application of the SDT-affordance framework rather than as a confirmatory test of universal mechanisms. The single-account setting is therefore treated as a contextual boundary, not as a basis for broad generalization. The objective is to assess whether the pattern observed in prior SFV health-information studies is also observable in a career-information context and to clarify the limits of that pattern.

Accordingly, this study addresses two research questions: RQ1: How are SFV affordances associated with autonomy, competence, and relatedness satisfaction in the context of internship information? and RQ2: How are these psychological needs associated with Gen Z's intention to adopt internship information encountered on TikTok?

Consistent with these questions, the article makes three contributions. First, it adapts Song et al's SDT-affordance framework to the study of internship-information adoption. Second, it offers exploratory evidence from a single

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TikTok creator community that is consistent with the theorized relationship between affordances, psychological need satisfaction, and information-adoption intention (IAI). Third, it develops context-sensitive implications and future research propositions for multi-creator, multi-platform, longitudinal, and cross-national studies of career information in platform environments.

2. LITERATURE REVIEW

Generation Z is commonly described as a cohort whose everyday information practices are strongly embedded in mobile connectivity and platform-based media use (Bencsik et al., 2016; Francis & Hoefel, 2018). This pattern is important for career discovery because internship and job-search information no longer reaches young users only through formal university channels. It also circulates through feeds, reposts, creator recommendations, peer sharing, and algorithmically distributed content. In Indonesia and elsewhere, TikTok's major user segments overlap with late-teen and young-adult groups, making the platform particularly relevant for early-career information communication (Rakhmah, 2021).

Prior studies show that TikTok and other SFV platforms are used for more than entertainment. Research on educational, lifestyle, and branded content suggests that users often treat short videos as informational resources, especially when the content is concise, vivid, easily circulated, and socially engaging (Liu, 2024; Rizomyliotis et al., 2024; Youn et al., 2024). In the context of internship information, this format may be especially attractive because deadlines, eligibility criteria, application procedures, and practical advice can be compressed into short and accessible micro-content.

Career information seeking is also sensitive to clarity, perceived usefulness, and social reassurance. Users who search for internship opportunities often face uncertainty about eligibility, deadlines, required documents, application procedures, selection processes, and expected outcomes. In this setting, SFV may reduce information friction by presenting opportunities in concise, visually accessible, and socially interactive formats. However, the same platform features may also blur the boundaries between entertainment, advice, promotion, and actionable career guidance. This makes it important to examine how users perceive SFV affordances and how these perceptions are associated with their intention to adopt internship information.

This study draws on SDT to explain the motivational dimension of information adoption. SDT argues that motivated engagement is strengthened when people experience autonomy, competence, and relatedness (Deci & Ryan, 1985; 1987; Ryan & Deci, 2020). In information contexts, autonomy refers to users' sense of volition or self-endorsed choice when using information. Competence refers to users' feelings that they are capable of understanding and acting on the information. Relatedness refers to users' sense of being socially connected, supported, or acknowledged while engaging with an information environment. Need satisfaction has been associated with adaptive outcomes across learning, health, and exercise contexts (Ng et al., 2012; Standage & Ryan, 2020).

The present study also draws on the affordance perspective. Affordances describe the action possibilities that environments and technologies make available to users (Gibson, 1979; Norman, 1988). Information systems research has further refined this concept by showing that technological features, user practices, and sociocultural contexts jointly shape what users can do and how they interpret those possibilities (Volkoff & Strong, 2013; Zhao et al., 2020). Motivational affordances focus more specifically on how technological features may support or frustrate psychological needs (Zhang, 2008). Within SFV environments, three affordance families are particularly relevant: hedonic affordances (HA), utilitarian affordances (UA), and connective affordances (CA) (Scheepers & Middleton, 2013; Wu & Lu, 2013; Zhao & Tang, 2016).

HA refer to the enjoyable, entertaining, and affectively engaging qualities of SFV content. UA refer to the usefulness, clarity, and practical value of information that helps users understand what to do. CA refer to the interactional and relational possibilities created through comments, replies, sharing, visibility of other users' responses, and perceived access to a creator community. In internship-information settings, these three affordances may matter because users need not only attractive content but also actionable guidance and social reassurance before deciding whether to save, share, discuss, or act on the information.

The present study is most directly grounded in Song et al's TikTok-based health-information research. Song et al. (2021) showed that affordances can shape user experience and continued information use in short-video health contexts. Song et al. (2022) further developed an SDT-affordance model in which HA support autonomy satisfaction, UA support competence satisfaction, CA support relatedness satisfaction, and all three psychological needs are associated with information adoption. The current study treats this model as its primary theoretical and method-

ological foundation, while examining whether a similar pattern is observable when the informational object is internship information rather than health information.

Recent studies on SFV platforms indicate that users engage with TikTok, Instagram Reels, and YouTube Shorts not only for entertainment, but also for information discovery, learning, social validation, and decision support. This is relevant for internship information because users must evaluate not only whether a post is attractive, but also whether it is understandable, credible, socially reinforced, and actionable. The present study therefore positions internship-information adoption as a platform-mediated information behavior shaped by the interaction between perceived content affordances and psychological need satisfaction.

Following Song et al. (2022), this study expects competence, autonomy, and relatedness satisfaction to be positively associated with IAI. It also expects UA to be positively associated with competence satisfaction, HA with autonomy satisfaction, and CA with relatedness satisfaction. However, because the study uses a single-account convenience sample and a cross-sectional design, these expectations are treated as theory-informed exploratory propositions rather than confirmatory hypotheses.

P1a: Competence satisfaction is positively associated with IAI.

P1b: Autonomy satisfaction is positively associated with IAI.

P1c: Relatedness satisfaction is positively associated with IAI.

P2: UA are positively associated with competence satisfaction.

P3: HA are positively associated with autonomy satisfaction.

P4: CA are positively associated with relatedness satisfaction.

3. RESEARCH METHODS

This study used a cross-sectional online survey and is best understood as an exploratory single-account case. The empirical context was the TikTok account @ Baihaqi Hamman | Info Magang, which regularly posted internship-oriented SFV and had approximately 10,900 followers as of 1 March 2023. The study does not aim to estimate population prevalence or establish universal causal mechanisms. Instead, it examines whether the observed relationships within a one internship-focused creator community are consistent with the SDT-affordance framework.

Participants were recruited through non-probability purposive and convenience sampling procedures. Recruitment focused on followers of the focal account and adjacent audiences reached through TikTok and Instagram direct messages. Data collection was conducted from 13 March to 13 April 2023. The original dataset consisted of 729 entries. After incomplete, patterned, and ineligible responses were removed, 422 valid responses remained for analysis. Because the sample was follower-based and convenience-recruited, the findings should be interpreted as context-bound associations rather than representative estimates of all TikTok users, all internship-information audiences, or Gen Z more broadly.

The questionnaire consisted of 39 items and was administered in Indonesian. Twenty-one reflective items measured seven latent constructs: HA, UA, CA, autonomy need satisfaction (ANS), competence need satisfaction (CNS), relatedness need satisfaction (RNS), and IAI. Each latent construct was measured using three indicators on a five-point Likert scale, ranging from 1=strongly disagree to 5=strongly agree. The remaining 18 items captured participant profile and platform-use characteristics. The reflective measures were adapted from Song et al. (2021; 2022), with the content domain changed from health information to internship information. Appendix A presents the reflective measurement items, while Appendix B summarizes the non-latent profiling and platform-use variables.

Data were collected through SurveyMonkey (SurveyMonkey Inc., San Mateo, CA, USA), cleaned using IBM SPSS Statistics version 23 (IBM Corp., Armonk, NY, USA), and analyzed using SmartPLS (SmartPLS GmbH, Monheim am Rhein, Germany). Internal consistency was assessed using Cronbach's alpha and composite reliability. Convergent validity was assessed through average variance extracted (AVE) and outer loadings. Discriminant validity was assessed using the Fornell-Larcker criterion, cross-loadings, and the heterotrait-monotrait ratio (HTMT) (Fornell & Larcker, 1981; Henseler et al., 2015; Voorhees et al., 2016). Variance inflation factors were also examined to screen for problematic collinearity, using 3.3 as a conservative benchmark (Kock, 2015). Structural relationships were estimated using partial least squares structural equation modelling (PLS-SEM) with non-parametric bootstrapping based on 5,000 resamples (Hair Jr et al., 2014; Henseler et al., 2016).

Because the study is exploratory and cross-sectional,

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the estimated coefficients are interpreted as associations rather than evidence of causality. The SDT-affordance model is theoretically process-oriented because it assumes that platform affordances may support psychological need satisfaction, which is then associated with IAI. However, the present design observes all variables at one point in time and therefore cannot establish temporal ordering or rule out reverse relationships. The results should consequently be read as theory-consistent patterns within one creator community, not as causal evidence.

The model is also specified as an indirect-only model. Hedonic, utilitarian, and CA are linked to IAI through autonomy, competence, and relatedness satisfaction rather than through direct affordance-to-intention paths. As a result, the study can describe whether the observed pattern is consistent with the theorized SDT-affordance pathway, but it cannot assess partial mediation. Future studies should compare indirect-only and partial-mediation specifications, ideally using longitudinal, multi-account, or behavioral data designs.

4. RESEARCH RESULTS

4.1. Sample Profile

A total of 422 valid responses from followers of @Baihaqi Hamman | Info Magang were analysed. The sample was predominantly female (64.9%), and most respondents were in the late-teen to early-twenties age range. Senior high school or equivalent was the most common highest educational level (52.8%), followed by bachelor's degree (30.6%) and diploma (16.6%). In terms of follower tenure, 38.2% of respondents had followed the account for less than three months.

The most frequently reported information need was internship vacancies (38.2%), while the most common reported action after seeing the creator's posts was applying to fewer than three opportunities (53.1%). Respondents most often sought career advice from peers (29.9%) and social media (27.5%). These descriptive patterns suggest that the sample represents an active internship-information audience, although not necessarily an audience with high application conversion. The profile is therefore useful for understanding the focal creator community, but it should not be interpreted as representative of all Gen Z TikTok users or all internship seekers.

4.2. Measurement Model

The measurement model showed acceptable internal consistency and convergent validity for an exploratory study. Cronbach's alpha values ranged from 0.643 to 0.845, composite reliability values ranged from 0.803 to 0.907, and all AVE values exceeded the recommended 0.50 threshold. In addition, each intended indicator loaded more strongly on its assigned construct than on alternative constructs, supporting cross-loading adequacy (Tables 1, 2).

Discriminant validity was acceptable overall, although some values require cautious interpretation. Most HTMT values were below the stricter 0.85 guideline. However, HA-RNS (0.881) and HA-IAI (0.851) exceeded this stricter threshold while remaining below the more liberal 0.90 benchmark. The HA-RNS value suggests conceptual proximity between enjoyment-oriented perceptions of SFV content and feelings of social connectedness. The HA-IAI value is also important because it involves constructs that are not adjacent in the structural sequence, indicating that hedonic perceptions may overlap with users' intention to save, share, or act on internship information.

Table 1. Correlations and psychometric characteristics (Fornell-Larcker matrix)

Construct	HA	CA	UA	ANS	RNS	CNS	IAI	α	CR	AVE
Hedonic affordances (HA)	0.780	0.580	0.569	0.592	0.689	0.559	0.620	0.679	0.823	0.609
Connective affordances (CA)	0.580	0.762	0.538	0.563	0.655	0.617	0.613	0.643	0.803	0.580
Utilitarian affordances (UA)	0.569	0.538	0.777	0.610	0.551	0.596	0.568	0.680	0.819	0.604
Autonomy satisfaction (ANS)	0.592	0.563	0.610	0.778	0.576	0.602	0.605	0.677	0.821	0.606
Relatedness satisfaction (RNS)	0.689	0.655	0.551	0.576	0.874	0.636	0.634	0.845	0.907	0.764
Competence satisfaction (CNS)	0.559	0.617	0.596	0.602	0.636	0.796	0.616	0.714	0.838	0.633
Information-adoption intention (IAI)	0.620	0.613	0.568	0.605	0.634	0.616	0.801	0.722	0.843	0.642

Diagonal values in the correlation block are the square roots of AVE. Off-diagonal values are inter-construct correlations. The composite reliability value for information-adoption intention is reported as 0.843 based on the indicator loadings.
CR, composite reliability; AVE, average variance extracted.

Table 2. Indicator loadings and cross-loadings

Construct	Item	HA	CA	UA	ANS	RNS	CNS	IAI
Hedonic affordances (HA)	HA1	0.827	0.404	0.356	0.496	0.575	0.466	0.502
	HA2	0.724	0.450	0.444	0.425	0.468	0.418	0.418
	HA3	0.787	0.402	0.336	0.404	0.525	0.409	0.483
Connective affordances (CA)	CA1	0.278	0.639	0.290	0.353	0.322	0.380	0.349
	CA2	0.381	0.769	0.380	0.427	0.408	0.434	0.440
	CA3	0.518	0.861	0.412	0.492	0.573	0.509	0.464
Utilitarian affordances (UA)	UA1	0.382	0.380	0.845	0.419	0.363	0.365	0.400
	UA2	0.242	0.213	0.640	0.314	0.157	0.245	0.311
	UA3	0.460	0.466	0.830	0.493	0.472	0.455	0.472
Autonomy satisfaction (ANS)	ANS1	0.378	0.424	0.411	0.703	0.350	0.413	0.357
	ANS2	0.408	0.383	0.393	0.774	0.370	0.349	0.379
	ANS3	0.523	0.499	0.455	0.851	0.494	0.514	0.546
Relatedness satisfaction (RNS)	RNS1	0.608	0.564	0.419	0.508	0.898	0.515	0.537
	RNS2	0.638	0.534	0.435	0.476	0.910	0.517	0.536
	RNS3	0.510	0.445	0.340	0.394	0.811	0.444	0.458
Competence satisfaction (CNS)	CNS1	0.495	0.525	0.394	0.464	0.498	0.826	0.481
	CNS2	0.316	0.395	0.272	0.359	0.347	0.729	0.337
	CNS3	0.481	0.462	0.440	0.481	0.478	0.827	0.483
Information-adoption intention (IAI)	IAI1	0.558	0.488	0.422	0.463	0.537	0.459	0.809
	IAI2	0.453	0.420	0.411	0.453	0.435	0.465	0.818
	IAI3	0.424	0.411	0.413	0.433	0.428	0.408	0.776

For each row, the highest loading appears on the intended construct.

Table 3. Heterotrait-monotrait ratio (HTMT)

Construct	ANS	CNS	CA	HA	IAI	RNS	UA
Autonomy satisfaction (ANS)	1						
Competence satisfaction (CNS)	0.774	1					
Connective affordances (CA)	0.835	0.846	1				
Hedonic affordances (HA)	0.822	0.773	0.781	1			
Information-adoption intention (IAI)	0.782	0.755	0.800	0.851	1		
Relatedness satisfaction (RNS)	0.682	0.711	0.768	0.881	0.743	1	
Utilitarian affordances (UA)	0.770	0.635	0.679	0.682	0.721	0.556	1

Most HTMT values are below 0.85. HA-RNS (0.881) and HA-IAI (0.851) exceed the stricter 0.85 guideline but remain below the more liberal 0.90 benchmark.

Because the Fornell-Larcker criterion was satisfied and the cross-loading pattern remained appropriate, the constructs were retained. Nevertheless, these borderline HTMT values indicate that future studies should refine the measurement scales, especially by distinguishing more clearly between entertainment, social bonding, and adoption-oriented responses (Table 3).

The measurement results also point to areas for future

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refinement. The borderline HTMT values for HA-RNS and HA-IAI suggest some conceptual overlap between enjoyment, social connection, and adoption intention in SFV environments. In addition, UA2 and CNS2 showed comparatively weaker loadings than other indicators, although they remained within an acceptable exploratory range. These findings suggest that future scale development should sharpen the distinction between usability, perceived competence, entertainment, and socially embedded motivation.

4.3. Structural Model

Fig. 1 and Table 4 summarize the structural model. All six theorized paths were positive and statistically significant. IAI was positively associated with autonomy satisfaction (ANS: β=0.269, p<0.001), competence satisfaction (CNS: β=0.229, p<0.001), and relatedness satisfaction (RNS: β=0.314, p<0.001). Together, these three psychological needs explained 46.2% of the variance in IAI (R^2=0.462).

Upstream relationships also followed the expected direction. HA were positively associated with autonomy satisfaction (HA→ANS: β=0.569, p<0.001; R^2 ANS=0.324), UA were positively associated with competence satisfaction (UA→CNS: β=0.475, p<0.001; R^2 CNS=0.226), and CA were positively associated with relatedness satisfaction (CA→RNS: β=0.591, p<0.001; R^2 RNS=0.350). In this exploratory single-account case, the observed relationships are therefore consistent with the theorized SDT-affordance pattern.

4.4. Descriptive Indirect-Effect Estimates

The conceptual model is mediational in structure because the affordances are linked to IAI through psychological need satisfaction rather than through direct affordance-to-intention paths. Using the reported standardized

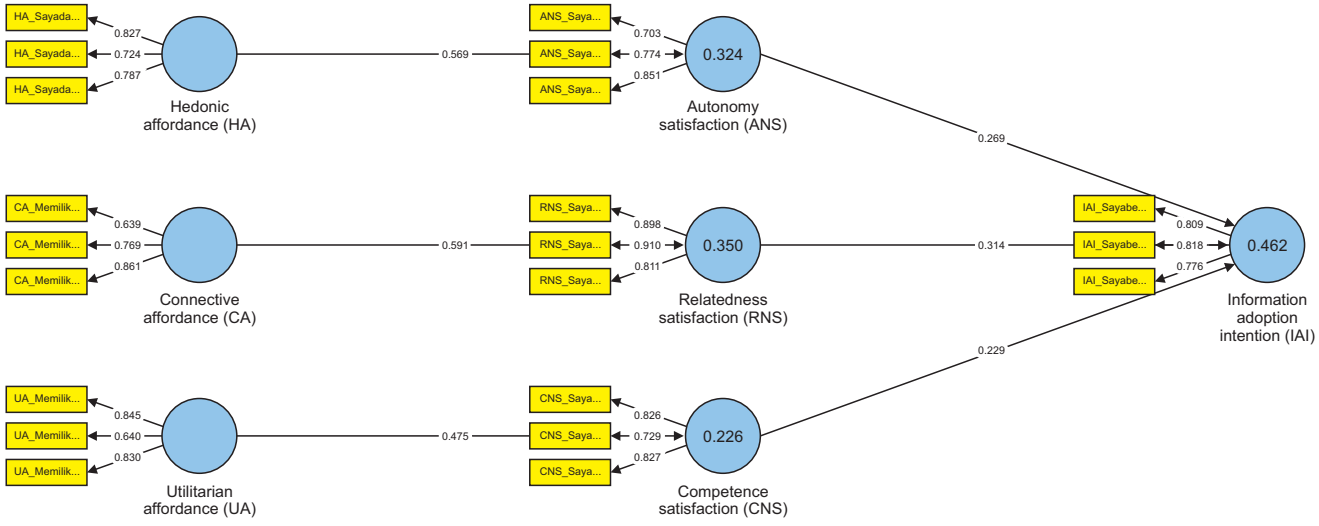


Fig. 1. Structural model results.

Table 4. Structural path estimates

Path	β	p-value	Result
CNS→IAI	0.229	<0.001	Consistent with proposition
ANS→IAI	0.269	<0.001	Consistent with proposition
RNS→IAI	0.314	<0.001	Consistent with proposition
UA→CNS	0.475	<0.001	Consistent with proposition
HA→ANS	0.569	<0.001	Consistent with proposition
CA→RNS	0.591	<0.001	Consistent with proposition

Bootstrapped significance tests were estimated in SmartPLS (SmartPLS GmbH, Monheim am Rhein, Germany) using 5,000 resamples. Because the study is exploratory and cross-sectional, the results are interpreted as theory-consistent associations rather than causal effects.

coefficients, the descriptive specific indirect estimates were HA→ANS→IAI=0.153, UA→CNS→IAI=0.109, and CA→RNS→IAI=0.186. The largest descriptive indirect estimate was therefore the connective-relatedness pathway.

These estimates should be interpreted cautiously. They are coefficient products calculated from the reported standardized direct paths, not fully bootstrapped mediation tests. In addition, the model should be read as an indirect-only specification. Because direct paths from hedonic, utilitarian, and CA to IAI were not estimated or compared with the indirect paths, partial mediation cannot be empirically assessed in the present study. Future research should compare indirect-only and partial-mediation models to determine whether affordances also have direct associations with adoption intention beyond psychological need satisfaction (Table 5).

5. DISCUSSION

This study examined whether the SDT-affordance framework developed in prior SFV health-information research can help explain internship-IAI in a career-information context. The findings provide theory-consistent evidence within one internship-focused TikTok creator community. However, because the study used a cross-sectional, single-account, and convenience-sample design, the results should be interpreted as exploratory associations rather than causal effects or generalizable evidence.

RQ1 asked how SFV affordances are associated with autonomy, competence, and relatedness satisfaction in the context of internship information. The findings indicate that the three affordance-need relationships followed the expected direction. HA were positively associated with autonomy satisfaction, UA were positively associated with competence satisfaction, and CA were positively associated with relatedness satisfaction. This pattern suggests that internship-related TikTok content may support different psychological needs through different perceived action possibilities. Enjoyable presentation may help users feel more self-directed in engaging with information, clear and useful content may support their sense of competence, and interactive features may strengthen feelings of social connection within the creator community.

Table 5. Descriptive specific indirect estimates

Specific indirect pathway	Coefficient product	Interpretation
HA→ANS→IAI	0.153	Positive descriptive indirect estimate
UA→CNS→IAI	0.109	Positive descriptive indirect estimate
CA→RNS→IAI	0.186	Largest descriptive indirect estimate

Coefficient products are calculated from the reported standardized direct paths and are presented descriptively. They should not be interpreted as fully bootstrapped mediation tests.

RQ2 asked how these psychological needs are associated with Gen Z's intention to adopt internship information encountered on TikTok. The results show that autonomy, competence, and relatedness satisfaction were all positively associated with IAI. Relatedness satisfaction showed the strongest association with adoption intention. This suggests that users may be more willing to save, share, discuss, or act on internship information when they feel socially connected, acknowledged, or reassured. In the context of internship information, this pattern is plausible because students may face uncertainty about eligibility, deadlines, application procedures, and selection expectations. Social interaction, visible clarification, and community-based reassurance may therefore reduce uncertainty and increase users' willingness to treat the information as actionable.

These findings suggest that the SDT-affordance framework is a useful interpretive lens for understanding internship-information adoption on TikTok. Consistent with Song et al. (2022), psychological need satisfaction was positively associated with IAI, and the three affordance families were positively associated with their theorized psychological needs. The model therefore appears to travel meaningfully from the health-information domain to a career-information domain, at least within the present creator community. Nevertheless, this should not be read as a general validation of the model. Rather, the study shows that the framework provides a coherent way to interpret one context-bound case of internship-information adoption.

The strongest downstream association was the path from relatedness satisfaction to IAI. This finding is important because internship information is not only informational, but also social and evaluative. Users may not act on internship information simply because it is available or clearly presented. They may also need reassurance that the information is credible, that others are engaging with it, and that the creator or community can help clarify uncertainty. In practical terms, comment replies, public clarification, pinned explanations, and visible peer engagement may matter as much as the vacancy information itself. These interactional cues can make internship information

feel less isolated and more socially trustworthy.

The findings also provide conditional practical implications for internship-information creators and university career services. Internship communication should not focus only on posting vacancy information. It should also combine three elements: engaging presentation to sustain attention, clear and action-oriented details to support users' sense of competence, and responsive interaction to provide social reassurance. For example, creators and career services can improve content by explaining eligibility criteria, application steps, deadlines, required documents, and common mistakes in a concise format. They can also strengthen relatedness by responding to questions, clarifying confusion in the comments, and showing that users' concerns are recognized. However, these implications remain provisional because the study measured intention rather than verified application behavior.

The intention-behavior gap reinforces the need for caution. Although intention is an important proximal outcome, it does not always translate directly into actual behavior. Meta-analytic work shows that intention-behavior relationships are often weaker than assumed, and even meaningful changes in intention may lead to more modest behavioral change (Sheeran, 2002; Webb & Sheeran, 2006). Accordingly, the present findings suggest what may help users move toward action, but they do not demonstrate actual internship applications, interviews, selections, or placements. Future studies should therefore connect survey responses with behavioral indicators such as link clicks, saved posts, completed applications, interview invitations, or placement outcomes.

The cross-platform implications should also be treated carefully. The observed pattern may plausibly apply to adjacent SFV environments such as Instagram Reels or YouTube Shorts because these platforms also combine visual presentation, information compression, algorithmic distribution, and social interaction. However, this remains a proposition rather than an empirical conclusion. Platform norms, discoverability systems, creator credibility, institutional involvement, and cultural expectations may influence which psychological need pathway becomes most important. For example, a university career-service account may generate competence and credibility differently from an individual creator, while a peer-based creator community may generate stronger relatedness through informal interaction.

The results also raise a measurement issue that is theoretically meaningful. The borderline HTMT values for HA-RNS and HA-IAI suggest that enjoyment, social connection, and adoption intention may overlap in SFV environments. This does not invalidate the measurement model, because the Fornell-Larcker criterion and cross-loading results remained acceptable. However, it indicates that users may experience entertaining content, social bonding, and willingness to adopt information as closely connected responses. Future scale development should therefore sharpen the distinction between entertainment, social reassurance, perceived usefulness, and adoption-oriented responses. Alternative model specifications, including higher-order constructs or partial-mediation models, may also help clarify the relationship among these concepts.

Several methodological limitations should be considered when interpreting the findings. First, the cross-sectional design limits causal inference. Although the SDT-affordance framework is process-oriented, the present data were collected at one point in time and cannot establish temporal ordering or rule out reverse relationships. Second, the model is an indirect-only specification. Because direct paths from hedonic, utilitarian, and CA to IAI were not estimated, partial mediation cannot be empirically assessed. Third, all latent constructs were measured using self-report items in a single survey, creating a risk of common method variance. The VIF results provide a useful collinearity check, but they are insufficient to rule out method bias. Fourth, the PLS-SEM model did not include demographic and platform-use variables as controls, even though 18 profiling and usage items were collected for descriptive purposes. This omission may introduce omitted-variable bias if age, education, follower tenure, viewing frequency, or prior internship-seeking behavior is associated with both perceived affordances and adoption intention.

The single-account setting is the most important boundary condition of the study. The observed pattern may reflect the specific communication style, audience composition, interaction norms, and trust relationship within the @Baihaqi Hamman | Info Magang creator community. Although the account provides a relevant and information-rich setting for exploratory analysis, the findings should not be interpreted as representing all internship-information creators, all TikTok users, or Gen Z more broadly. Replication across multiple creators, platforms, and institutional career-information channels is necessary before broader conclusions can be drawn.

The practitioner-researcher context also requires caution. The focal account was both the empirical setting and the source from which respondents were recruited.

This design can be valuable for exploratory and action-oriented inquiry, but it may also create risks of expectancy, selection, and interpretation bias. To reduce these risks, the survey was anonymous, the reflective measures were adapted from established prior scales rather than created ad hoc, and data-cleaning decisions followed consistent rules. Even so, future research should strengthen independence through third-party recruitment, multi-account sampling, external validation, and the use of behavioral or administrative outcomes.

Future research should extend this study in several directions. First, studies should recruit respondents across multiple creators and platforms to test whether the observed pattern remains stable beyond one creator community. Second, longitudinal designs are needed to examine whether affordances influence psychological need satisfaction over time and whether adoption intention leads to actual application behavior. Third, future studies should incorporate behavioral data, such as click-throughs, saved posts, completed applications, or application outcomes. Fourth, experimental research could test whether specific design cues, such as verified source badges, pinned clarifications, creator replies, or direct application links, strengthen competence satisfaction or relatedness satisfaction. Finally, future research should include theoretically justified control variables or multi-group analyses to examine whether the relationships differ by age, education, follower tenure, viewing frequency, or prior internship-seeking experience.

Finally, the explanatory value of this study should not be overstated through direct comparison of R^2 values across studies. Cross-study R^2 comparisons depend on sample composition, measurement design, model specification, platform context, and informational domain. The appropriate interpretation is not that this study outperforms earlier work, but that it shows a theoretically coherent pattern in a new career-information context. In this sense, the study contributes exploratory, context-bound evidence that can support a broader program of research on career information, SFV platforms, and motivated information adoption.

6. CONCLUSION

This study explored whether the SDT-affordance framework developed in prior TikTok health-information research can help explain internship-IAI in a career-information context. Based on one internship-focused TikTok creator community, the findings were consistent with the expected pattern. HA were positively associated with autonomy satisfaction, UA with competence satisfaction, and CA with relatedness satisfaction. Autonomy, competence, and relatedness satisfaction were also positively associated with IAI, with relatedness showing the strongest association.

This study contributes to information science by adapting the SDT-affordance framework to internship information on SFV platforms. This contribution should be understood as exploratory and context-bound rather than confirmatory. This study does not validate the framework in a general sense or establish causal relationships. Instead, it shows that the framework offers a useful interpretive lens for understanding how perceived platform affordances and psychological need satisfaction may be associated with users' intention to adopt internship information within one creator community.

The findings also provide a starting point for broader research on career information in platform environments. This study suggests that internship information may be more adoptable when it is engaging enough to attract attention, clear enough to support users' sense of competence, and interactive enough to provide social reassurance. Future studies should test these propositions across multiple creators, platforms, institutions, and national contexts and connect intention measures with behavioral outcomes such as saved posts, link clicks, completed applications, interviews, or internship placements. Such work would clarify whether the theory-consistent patterns observed in this exploratory case also hold in broader and more varied career-information settings.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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APPENDIX A. REFLECTIVE MEASUREMENT ITEMS

The survey was administered in Indonesian. English glosses are provided for review transparency. All reflective items used a five-point Likert response scale, where 1=strongly disagree and 5=strongly agree.

Appendix Table A1. Reflective items

Construct	Code	Indonesian wording used in the survey	English gloss
Hedonic affordances (HA)	HA1	Video informasi magang di akun ini menyenangkan untuk ditonton	The internship-information videos on this account are enjoyable to watch
	HA2	Saya menikmati menonton video informasi magang di akun ini	I enjoy watching internship-information videos on this account
	HA3	Konten akun ini membuat saya tertarik untuk terus mengikuti informasi magang	The content on this account keeps me interested in following internship information
Utilitarian affordances (UA)	UA1	Akun ini membantu saya menemukan informasi magang yang saya butuhkan	This account helps me find the internship information that I need
	UA2	Informasi magang di akun ini jelas dan mudah dipahami	The internship information on this account is clear and easy to understand
	UA3	Konten akun ini membantu saya mempelajari detail yang penting untuk mengambil keputusan	The content on this account helps me learn details that matter for making decisions
Connective affordances (CA)	CA1	Fitur di akun ini memudahkan saya berkomunikasi dengan kreator atau pengguna lain	The features on this account make it easy for me to communicate with the creator or other users
	CA2	Komentar, balasan, atau pesan membantu saya meminta pendapat orang lain tentang informasi magang	Comments, replies, or messages help me ask other people's opinions about internship information
	CA3	Interaksi di akun ini membantu saya memperoleh klarifikasi atau tambahan informasi magang	Interaction on this account helps me obtain clarification or additional internship information
Autonomy need satisfaction (ANS)	ANS1	Saya merasa bebas memilih informasi magang mana yang ingin saya baca atau tonton	I feel free to choose which internship information I want to read or watch
	ANS2	Saya merasa keputusan untuk menggunakan informasi magang dari akun ini adalah pilihan saya sendiri	I feel that using internship information from this account is my own choice
	ANS3	Saya merasa tidak terpaksa ketika menggunakan informasi magang dari akun ini	I do not feel pressured when I use internship information from this account
Competence need satisfaction (CNS)	CNS1	Saya merasa mampu memahami informasi magang yang disampaikan akun ini	I feel capable of understanding the internship information provided by this account
	CNS2	Saya merasa yakin dapat menggunakan informasi dari akun ini untuk mengambil keputusan	I feel confident that I can use information from this account to make decisions
	CNS3	Informasi dari akun ini membuat saya merasa lebih siap untuk bertindak	Information from this account makes me feel more prepared to act
Relatedness need satisfaction (RNS)	RNS1	Saya merasa dekat dengan orang-orang yang berinteraksi di akun ini	I feel close to the people who interact on this account
	RNS2	Saya merasa dipedulikan oleh kreator atau pengguna lain di akun ini	I feel cared for by the creator or other users on this account
	RNS3	Saya merasa menjadi bagian dari komunitas yang saling membantu di akun ini	I feel that I am part of a community that helps one another on this account
Information-adoption intention (IAI)	IAI1	Saya berniat menggunakan informasi magang dari akun ini ketika mencari peluang magang	I intend to use internship information from this account when looking for opportunities
	IAI2	Saya berniat menyimpan atau membagikan informasi magang dari akun ini	I intend to save or share internship information from this account
	IAI3	Saya berniat melamar peluang magang yang saya temukan melalui akun ini	I intend to apply for internship opportunities that I find through this account

APPENDIX B. PROFILING AND PLATFORM-USE ITEMS

The remaining non-latent items were used for descriptive profiling rather than as reflective indicators in the structural equation modeling (SEM) model. They are reported here to improve transparency regarding the questionnaire structure and to clarify that these variables were not included as control variables in the PLS-SEM analysis.

Appendix Table B1. Profiling and platform-use domains

Item	Profiling or usage domain	Response format	Purpose
P1	Age	Open numeric or year-based	Demographic profile
P2	Gender	Categorical	Demographic profile
P3	Highest educational attainment	Categorical	Demographic profile
P4	Current study or work status	Categorical	Profile of respondent context
P5	Province or city of residence	Categorical or open field	Geographic description
P6	Main current career stage	Categorical	Profile of respondent context
P7	Whether currently seeking an internship	Yes or no	Screening and context
P8	Whether also seeking jobs or freelance opportunities	Yes or no or multiple choice	Search context
P9	Length of following the focal account	Categorical	Follower tenure
P10	Frequency of viewing the creator's posts	Ordinal	Exposure level
P11	Main type of information sought from the account	Multiple choice	Information need
P12	Whether the respondent has saved posts from the account	Yes or no	Engagement behavior
P13	Whether the respondent has shared posts from the account	Yes or no	Engagement behavior
P14	Whether the respondent has clicked external links or link-in-bio resources	Yes or no	Action-oriented engagement
P15	Number of internship applications made from the creator's posts	Categorical count	Behavioral self-report
P16	Whether any application led to follow-up contact or interview	Yes or no	Behavioral self-report
P17	Primary source of career advice	Multiple choice	Comparison with other sources
P18	Other platforms used for career or internship information	Multiple choice or open field	Media ecology context

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Media in the Construction of Terrorism Narratives: An Analytical Study on the Coverage of the Makassar Cathedral Church Bombing

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ABSTRACT

This study aims to understand how media framing operates in Indonesia in the context of sensitive issues such as terrorism and religion. This study also aims to provide an understanding of how Indonesian journalism handles sensitive religious issues and to reveal the potential impact of various framing strategies on public perception and social stability. The research method employs Gamson and Modigliani's framing model analysis, offering a holistic framework by integrating various framing elements, including metaphors, exemplars, catchphrases, depictions, and visual images. The objects of the study are the two most popular Indonesian online media outlets in 2024, namely Detik.com and Kompas.com. The results of the analysis show that the two media sites apply different but complementary framing strategies in shaping public understanding of terrorist events. Detik.com shows a tendency to construct reality through dramatization and sensationalization. In contrast, Kompas.com adopts a more conservative approach, focusing on moral-spiritual dimensions and implementing a policy of not displaying photos of perpetrators and victims as a form of sensitive journalistic ethics. The media's construction of reality regarding this event has the potential to create "violence" against the Muslim community, especially Muslim women, in the context of representation and social stigmatization, because their religious identity is very easily identified from their visual appearance. Framing analysis reveals that media framing strategies have consequences that go far beyond the mere delivery of information, but can significantly affect the social lives of Muslim women in Indonesia's plural and complex society.

Keywords: framing, media, terrorism, Makassar Cathedral Church, Muslim women

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1. INTRODUCTION

Indonesia, as a country with high religious diversity, faces complex challenges in maintaining social harmony amid the threat of terrorism targeting places of worship. The suicide bombing that occurred at Makassar Cathedral on Palm Sunday, March 28, 2021, was a form of violence that shocked the Indonesian public and sparked intense public discourse in various mass media. The tragedy, which killed the two perpetrators and injured dozens of churchgoers and security officers, became the primary focus of national and international news coverage. In the context of a religiously diverse country such as Indonesia, a terrorist act targeting a place of worship not only has security implications but also has the potential to affect the dynamics of interfaith relations that have been carefully built up over time.

The mass media, as the primary agent in the distribution of information, have a strategic role in framing and narrating these events to the public. The way the media frames violent events related to religious issues can influence how the public interprets, understands, and responds to these events. However, the practice of framing terrorism news is often caught in a dilemma between commercial interests, news value, and ethical responsibility. This phenomenon becomes more complicated when the media must balance transparency of information with the potential negative impact on public perception of certain religious groups.

In the context of the attack on the Makassar Cathedral Church, the Indonesian media faced a particular challenge because this event targeted a place of worship for a minority in a Muslim-majority country. The way the media frames this event not only influences public perceptions of terrorism but can also have an impact on interfaith relations and long-term social stability.

Although there have been studies on the framing analysis of the bomb explosion at Makassar Cathedral Church (Anipar & Rachmaria, 2022), no study has yet compared the framing of popular media in Indonesia. Previous studies have only analyzed framing in one popular Indonesian press outlet and used a different model, namely Robert N. Entman's. This gap is essential to fill, considering that the Makassar Cathedral incident is not an isolated case in the history of terrorism in Indonesia.

Based on this background, the main issues of this study are how the popular Indonesian media outlets Detik.com and Kompas.com framed the Makassar Cathedral bombing and what the potential social impacts of these framing strategies are on public perception and interfaith relations. This study examines two crucial dimensions: first, the framing patterns used by the media in presenting the incident, and second, the social consequences of these framing choices on the harmony of diversity in Indonesia. This research is also necessary considering the sensitivity of issues involving religious dimensions in the context of Indonesia's multicultural society. An in-depth study of how the media frames this incident can reveal possible biases in news presentation.

This study aims to understand how news media framing in Indonesia operates in the context of sensitive issues such as terrorism and religion. Furthermore, this study is expected to provide an understanding of how Indonesian journalism practices deal with sensitive religious problems and reveal the potential impact of various framing strategies on public perceptions and social stability.

From an academic perspective, this study contributes to understanding the role of the media in situations of conflict and violence within contemporary Indonesian society. While much research on media framing has been conducted in Western contexts (Ahmed & Matthes, 2017; Lewis & de Masi, 2007; McGarry et al., 2023; Norris et al., 2004; Powell, 2018), there is still a knowledge gap regarding how media in a Muslim-majority country with high religious diversity such as Indonesia frames terrorist events targeting religious minorities.

2. LITERATURE REVIEW

2.1. Media Bias

Media bias is defined as favoritism and unfair reporting toward specific points of view. We can see media bias through information that is deliberately selected in news reports that have the potential to influence public opinion. In addition, media bias can also take the form of labeling certain entities with ambiguous terms in concepts that carry positive or negative associations (Domke et al., 1999; Fan et al., 2019).

Media bias can spread through framing that emphasizes certain aspects and ignores others, which then influences public perception and understanding of an issue (Fiveable Content Team, 2025). The impact of media bias on public opinion goes far beyond mere division. When news media consistently present biased narratives, they reinforce the pre-existing beliefs and ideologies held by their audience. This divisive climate makes it even more challenging to find common ground and collectively address pressing issues, ultimately perpetuating social divisions.

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In the news, we can see media bias through the information chosen for reporting. The media chooses topics to frame with a bias toward events that attract attention (Price et al., 1997). Studies in the United States have identified that when perpetrators of violence are Muslims, it will be framed as an act of terrorism (Mitnik et al., 2020; Powell, 2011). In contrast, when the perpetrators of violence are white, the United States government refuses to label it as an act of terrorism, and this affects how the media reports it (Betus et al., 2021). This bias can shape public sentiment about Muslims and public perceptions of terrorism (Betus et al., 2021).

In some literature, media bias is conceptualized as intentional (Hamborg et al., 2019), but there is also unintentional and unavoidable media bias because bias is a natural human condition (Elejalde et al., 2017; Kang & Yang, 2022). Unintentional media bias usually depends on the background of journalists who do not make a concerted effort to understand other points of view, thus constantly involving personal views that influence news reports (Bozell & Baker, 1990).

2.2. Media Construction of Reality

Today, the media plays an essential role in distributing information and shaping public opinion, acting as a link between facts and the perceptions of the wider community. This role requires a more comprehensive examination. The urgency of examining the media stems from its remarkable capacity to shape our thinking and understanding of the world, as well as its role as the primary reference for concepts and perspectives. The media is also capable of influencing a person's conduct and perspective. This power is even more evident when the media is used for various agendas. The media is often used as a means of propaganda to shape public opinion according to the will of political rulers. Therefore, media analysis is essential to expose the tendencies and forces that drive the production of news and information (Burton, 1993; Herman & Chomsky, 1988).

The media presents an incomplete, biased picture of reality that often contradicts the issues faced by modern society. Therefore, news is more accurately understood as a product of social construction rather than an objective reflection of reality (Nišić & Plavšić, 2017; Yan, 2020). The media functions as a forum for discourse that contributes to the development of a collective understanding of life and essential values, while also determining standards for what is considered right or wrong, constructive or destructive (Kellner, 2020). The influence of the media on a person's perspective begins with the reality constructed by the media into journalistic products. The journalistic products presented do not fully describe empirical truth or the actual situation as it is (Tuchman, 1978).

Previous studies have found that negative news coverage against certain religious groups, especially Islam, is widespread in the media. They found that the steering of public opinion was caused by negative news construction, which can reinforce stereotypes that lead to discrimination and social injustice (Ahmed, 2012; Ahmed & Matthes, 2017; Bleich & Van der Veen, 2022; Norris et al., 2004; Saeed, 2003; 2007). News coverage of Islam and Muslims often uses inaccurate terms, such as *jihadists*, *terrorism*, and *Islamic extremism*, which are usually applied without a proper explanation of their meaning.

Academic studies in the West confirm similar findings by investigating the sources of Islamophobia through studies of the representation of Islam and Muslim communities in the news media. The media in Western countries tends to highlight Islam and create stereotypes of Muslims associated with terrorism and violence (Moore et al., 2008; Saeed, 2007; Törnberg & Törnberg, 2016; Yusof et al., 2013).

2.3. Media and Terrorism

In the context of covering terrorist acts, the media is in a vital but dilemma-filled situation. The media has an obligation to disseminate information to the public. However, the way the media constructs reality often creates narratives that contain Islamophobia and prejudice, which can then influence public perception of Muslims. The media's attention to the link between terrorism and Muslims appears to be unbalanced. The media has correctly reported that acts of terrorism committed in the name of Islam by extremists stem from a distorted understanding of jihad and Islamic teachings. However, this coverage often leads to the creation of stories that generalize Muslims as a whole.

Negative representations of Islam and Muslims in Western media are not a new phenomenon. Negative reporting on Islam and Muslims existed before the events of September 11, 2001 (9/11) (Manning, 2003; Norris et al., 2004). However, this issue resurfaced after 9/11, where several studies have revealed that Western media coverage of Islam and Muslims tends to be negative and emphasizes stereotypes, discrimination, and portrayals of violence as religiously justified, and consistently associates Islam and Muslims with terrorism, placing them in an unfavorable position. The Western media's efforts initially focused on

Muslim groups accused of being responsible for the September 11 attacks, and ultimately hurt the entire Muslim community worldwide (Alghamdi, 2015; Aly, 2007; Gerges, 2003; Richardson, 2001; Semati, 2010; Shahin, 2015; Tama & Sulistyaningrum, 2023; Winegar, 2008).

Media and terrorism have a symbiotic relationship (Akbarzadeh & Smith, 2005). Terrorism can become news with an appeal to the media that cannot be ignored or denied (Amanda Gelgel, 2020; Miller, 1982). Terrorists in turn use the media to showcase their acts of terror (Douai & Lauricella, 2014).

In relation to Indonesia, it is essential to examine how the media reports on terrorism issues, given the impact this can have on shaping public perceptions of group and national identity. A series of bombings has occurred in Indonesia, both large and small, such as the Bali bombings (2002), the JW Marriot Hotel bombing (2003), the Australian Embassy bombing (2004), the Jimbaran/Bali II bombing (2005), the JW Marriot II and Ritz Carlton bombing (2009), and the Sarinah bombing (2016), which have made Indonesia the subject of media coverage around the world. The Australian media, namely the *Herald Sun* and *The Age*, have shown how Islam has become synonymous with terrorism. The global narrative about Islam after 9/11 was promoted and reinforced by the Bali bombings. Negative views of Islam were reinforced when the Australian media explicitly linked the bombings to Islam as a monolithic entity. The linking of the attacks in New York and Bali was based on the belief in a worldwide Muslim fundamentalist conspiracy against the "West." The Bali bombings, as portrayed in the Australian media, became a signal for Australia to support the American discursive strategy of the "War on Terror" (Hirst & Schutze, 2004; Lewis & de Masi, 2007).

Several media outlets in Indonesia used different perspectives in reporting on the terrorist attacks. Some of these studies focused on positive framing, namely building a discourse against terrorism but emphasizing the use of non-provocative words, while others assessed the attacks from a religious perspective and associated Muslims and Islam with these acts (Amanda Gelgel, 2020; Istriyani, 2016; Krissa, 2016).

In relation to Indonesia, studies on how the media communicates the issue of terrorism are of high urgency, given the effect it can have on influencing the public's view of religious communities and national identity. Indonesia, as a country with great religious diversity, offers a unique context for exploring these dynamics.

3. RESEARCH METHODOLOGY

In the landscape of contemporary communication and media research, choosing the correct analytical method is fundamental to producing valid and meaningful findings. Gamson and Modigliani's framing analysis model has emerged as indispensable for understanding how the media constructs social and political reality through the process of framing news and information.

The fundamental advantage of Gamson and Modigliani's model lies in its conceptualization of frames as "central organizing ideas for making sense of relevant events, suggesting what is at issue" (Gamson & Modigliani, 1989). This definition provides operational clarity that allows researchers to identify with precision how the media organizes narratives around specific issues. This model provides a concrete and systematically applicable analytical structure.

In a methodological context, Gamson and Modigliani's model offers a holistic framework by integrating various elements of framing, including metaphors, exemplars, catchphrases, depictions, and visual images (Eriyanto, 2002). This comprehensive approach allows researchers to capture the complexity of the framing process, which cannot be reduced to mere textual analysis. Each element in this model is interrelated and contributes to the formation of a complete interpretive package, providing a more comprehensive picture of how the media constructs meaning.

The objects of this study are the top two Indonesian online media outlets with the most readers in 2024 (Similarweb, 2025). We collected news articles through the search pages on both news portals using the category "suicide bombing of Makassar Cathedral." A total of 55 news articles were collected: 30 from Detik.com and 25 from Kompas.com. The news articles were collected from within five days, from March 28 to April 1, 2021, because news from that period became repetitive, with different headlines but duplicate content from earlier reports.

After collecting the news articles, the authors analyzed them using the Gamson and Modigliani model, which consists of two types of devices: framing devices (metaphors, exemplars, catchphrases, depictions, and visual images) and reasoning devices (roots and appeals to principle). The news articles were then classified according to device category. This study did not involve multiple coders because the data collected was on a small scale and relied solely on detailed documentation of each news article. In addition, peer debriefing was conducted with the supervisor.

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This study used several screenshots from news articles on Detik.com and Kompas.com as primary data. The use of this visual material is based on the principle of fair use in the context of academic research, with several considerations: The material is used solely for academic research purposes, not for commercial purposes, and the screenshots are taken from news content published openly for public consumption. Only the relevant and necessary parts for analysis are used, not the entire content.

4. RESULTS AND DISCUSSION

According to an in-depth analysis of all the framing elements used by the two online media outlets studied, it was revealed that both outlets had a particular and structured framing focus.

4.1. Detik.com

4.1.1. Metaphors

Detik.com uses various powerful metaphors to dramatize the explosion at the Makassar Cathedral. The metaphor "honeymoon" suggests that the husband and wife who carried out the suicide bombing considered the suicide bombing to be their honeymoon as newlyweds, which was then used as the headline for the March 31, 2021 edition.

In addition, metaphors can also be seen in the statement made in the March 29, 2021 edition, which stated that the propaganda of the terrorist network obtained by the perpetrators of the explosion was like a "Batman trap" whose doctrine was imperceptible and invisible, but could change a person's character and behavior of tolerance.

The phrase "damages tolerance" describes the implications of attacks on religious harmony, providing a visual impression of damage to the social order, particularly the established religious harmony. This can be seen in the statement by the United States Embassy reported in the article in the March 29, 2021 edition.

4.1.2. Catchphrases

The phrase "Becoming an International Spotlight" can attract readers' attention because the event was covered not only by national media but also by several international outlets, making it a concern for people in other countries. This can be seen in the title of the Detik article published on March 29, 2021, entitled "Suicide Bombing in Makassar Becomes International Spotlight."

In addition, the phrase "522nd Terrorist Attack in Indonesia" is also interesting because it creates a dramatic image that terrorist incidents have occurred frequently and repeatedly in Indonesia. The phrase can be seen in the headline "Deputy V KSP Calls Makassar Bombing the 522nd Terrorist Attack in Indonesia Since 2000" in the March 29, 2021 edition. The phrase "Female Bomber Was Pregnant" also attracts readers' attention because it reveals the fact that the female perpetrator was pregnant when she carried out the suicide bombing. This phrase can be seen in the headline "New Facts Revealed About Makassar's Female Bomber Who Was Pregnant," published on March 31, 2021.

4.1.3. Exemplars

Detik.com linked this incident to similar events that had occurred previously, such as the 2002 Bali bombings and the 2018 church bombings in Surabaya. Detik.com compared the Makassar bombing to the Bali bombings, which were carried out by members of the Jamaah Islamiyah organization, which did not allow children and women to be involved in the bombings. This is in contrast to the Makassar and Surabaya bombings, which were initiated by Jamaah Ansharut Daulah (JAD) and involved children and women. This is evident in the statement by terrorism expert Ridwan Habib from the University of Indonesia, as reported in the article published on March 31, 2021.

Detik.com also linked this incident to several other bombings carried out by other married couples. This link created a narrative pattern of terrorism as a recurring threat. This can be seen in the March 30, 2021 edition with the headline "A Series of Suicide Bombings Carried Out by Married Couples."

In addition, another reference is the statement by the Head of National Counterterrorism Agency (Badan Nasional Penanggulangan Terorisme; BNPT), Komjen Boy Rafli Amar, in the March 29, 2021 edition, which stated that the virus of radicalism often targets young people in the millennial category. This was identified from the birth dates of the two bombers, who were born in 1995 and belong to the millennial generation, which has become a characteristic of victims of terrorist networks propaganda. This feature is also reinforced by a statement from the Deputy Chairman of the National Awakening Party, Jazilul Fawaid, in an article published on March 30, 2021, titled "The Makassar Bombers are Millennials, We Often Miss Them," which states that an evaluation is needed regarding counterterrorism efforts, particularly among millennials, who are the primary targets for infiltration by

deviant doctrines.

4.1.4. Depictions

In its depiction of the parties involved, Detik.com has a clear pattern. The perpetrators are described with negative words such as "bomber couple" in every news report because, as is known, the perpetrators were indeed a married couple who had only been married for six months and were exposed to radical ideology and became part of the JAD group. In addition, Detik.com also labeled the perpetrators of the bombing as "millennial bombers." This can be seen in the March 30, 2021 edition with the headline "Millennial Makassar Bombers." This explains that both perpetrators were born in 1995 and fall into the millennial category.

In addition, Detik.com also gave a positive portrayal of the police, who were considered quick to handle the case. This is evidenced by several news articles revealing the arrest of several suspected terrorists involved in the suicide bombing in Makassar, only three days after the incident occurred. This can be seen from several news headlines, such as "Densus 88 Arrests Another Person, Bringing the Total to 8 Suspected Terrorists Arrested in Makassar" on March 31, 2021, "16 Suspected Terrorists Arrested in Makassar, All Helped the Bomber Couple" published on April 1, 2021, and "After the Makassar Bombing, Police Arrest 32 Terrorist Suspects in Several Areas," which was published on April 1, 2021.

Another positive portrayal was the emphasis on the human side of the Indonesian National Armed Forces (Tentara Nasional Indonesia, TNI)-Indonesian National Police (Polri) security forces. The positive portrayal can be seen in the news article "TNI Commander and National Police Chief Visit Victims of Makassar Suicide Bombing." In addition, there was news of an offer from the National Police Chief to the child of a victim who tried to stop the suicide bomber to become a police officer in the news article "National Police Chief Offers Kosmas' Child, Who Stopped the Makassar Bomber, a Position in the Police Force," published on March 31, 2021.

4.1.5. Visual Images

Detik.com utilizes visual power to reinforce framing. The article "Current Condition of the Cathedral Church After the Suicide Bombing" is accompanied by photos of damage to the church gate with police tape, emphasizing the reality and physical impact of the attack (Fig. 1) (Mappiwali, 2021b).

The article "South Sulawesi Regional Police Increase Security at Vital Objects After Makassar Suicide Bombing" shows fully armed Brimob personnel on standby, conveying a message about the state's serious response to the incident (Fig. 2) (Mappiwali, 2021a).

Interestingly, Detik.com displays photos of the two perpetrators riding a motorcycle wearing distinctive clothing. The man wears a cap and turban, while the woman wears a veil and an ample hijab that covers her entire body. This indicates the religious identity of the two perpetrators, who were Muslims in the CCTV images (Fig. 3) (Mappiwali, 2021c).



Fig. 1. Situation around Makassar Cathedral Church. Reused from Mappiwali (2021b) with permission of detikcom.



Fig. 2. Security after the suicide bombing at Makassar Cathedral Church. Reused from Mappiwali (2021a) with permission of detikcom.

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4.1.6. Roots

Detik.com consistently points to the root causes of extremist ideology and terrorist networks. Detik explains that the reckless actions of the perpetrators of the bombing at Makassar Cathedral Church were due to their jihadist doctrine and belief that they would die as martyrs by carrying out suicide bombings. This can be seen from the news about the suicide note left by one of the perpetrators of the bombing, which was reported in the March 29, 2021 edition at 15:14 Waktu Indonesia Barat-West Indonesian Time with the title "Makassar Suicide Bomber Leaves Suicide Note Ready to Die as Shahid" and the news on March 30, 2021, which reported the arguments of former terrorist convicts regarding the motives of the Makassar bombers.



Fig. 3. Visual image of the perpetrator of the Makassar Cathedral Church Bombing. Reused from Mappiwali (2021c) with permission of detikcom.

Another cause raised is online radicalization, as in the article "BNPT Suspects Makassar Bomber Couple Learned to Make Bombs Online." The article explains that the two perpetrators participated in online bomb-making training organized by a radical group whose members had been trained in various countries.

4.1.7. Appeals to Principle

Detik.com emphasizes moral values such as unity and tolerance. In the article "Majelis Ulama Indonesia (The Indonesian Ulema Council) Central Java on the Attack in Makassar-Police Headquarters: Terrorism Destroys Ukhuwah," Detik quotes a statement from the Chairman of the Indonesian Ulema Council of Central Java, Ahmad Darodji: "The Prophet taught Islam in a peaceful manner, how to be tolerant of Jews, Christians, and other religions. The Prophet set an example, so why not follow the Prophet?" In addition, another moral claim explained is that acts of terrorism are not related to any religion, as in the article "Vice President Ma'ruf Amin: Terrorism Has Nothing to Do with Religion." This is also reinforced in an excerpt from a news article published on March 29, 2021: "Jokowi said that terrorism is a crime against humanity that is not related to any religion." This statement separates acts of terror from religion and prevents stigmatization.

4.1.8. Consequences

Detik.com describes the various consequences of the attack. One of them is strengthening security in several re-

Table 1. Framing analysis results (Detik.com)

Framing devices		Reasoning devices	
Metaphors	Blasting action as the month of honey; radicalism like a Batman's trap	Roots	Terrorism network, extremist ideology, and radicalism online
Catchphrases	International attention, 522nd terrorist act, young pregnant female bomber	Appeals to principle	Terrorism destroys *ukhuwah* (unity), and terrorism is not related to any religion
Exemplars	The Bali bombing was carried out by members of Jamaah Islamiyah, who did not involve women and children; there were several suicide bombings carried out by married couples; Makassar bombers were millennials	Consequences	Strengthening security in several regions in Indonesia is in the international spotlight
Depictions	The perpetrator(s) as a married millennial couple, and the police as a swift and humane party		
Visual images	Church building with tight security by police officers, and a photo of the faces of the two perpetrators in typical Muslim clothing		

gions of Indonesia to prevent a recurrence. In the articles "Bali Police Tighten Port Security After Suicide Bombing in Makassar" and "After Makassar Suicide Bombing, Semarang Airport Tightens Security," the national impact of a local event is shown.

The international impact is also highlighted in the articles "US Embassy Warns Citizens Due to Makassar Bombing in Indonesia" and "Foreign Media Highlights Suicide Bombing in Makassar, Manila Lockdown." This emphasizes the consequences of a country's damaged image in the eyes of the international community due to terrorism (Table 1).

4.2. Kompas.com

4.2.1. Metaphors

The metaphor that can be seen in the issue of the bomb explosion at the Makassar Cathedral Church reported by Kompas.com is the phrase "selling paradise." The phrase is a statement from Jusuf Kalla, the Chairman of the Indonesian Mosque Council, in a news article published on March 29, 2021. The article revealed that the suicide bombing at the Makassar Cathedral Church occurred because there were people who "sold paradise" through the doctrine that suicide bombing was an act of jihad, whereby death guaranteed entry into paradise. In addition, there was also the metaphorical phrase "angkara murka" (wrathful anger). In the March 29, 2021 edition, the suicide bombing was likened to wrath because suicide bombing is an act of violence in the form of killing fellow human beings. This occurred in a statement from Jaya Suprana, founder of the Humanitarian Learning Center, with the news headline "Stop the Wrath of Suicide Bombings."

4.2.2. Catchphrases

The prominent sentence or phrase in Kompas' news about the bombing of the Makassar Cathedral Church is found in the news headline "Grief on Palm Sunday," in the March 29, 2021 edition. This refers to the timing of the incident, which coincided with Palm Sunday celebrations for Christians, which turned into grief due to the suicide bombing at the cathedral church.

4.2.3. Exemplars

In an effort to provide historical context and build a more comprehensive narrative, Kompas.com linked this incident to similar events such as the bombing on the island of Jolo, Philippines, in 2018. That bombing was also carried out by a married couple, as was the case at the Makassar Cathedral Church. The Makassar perpetrators were suspected of being affiliated with a group that had previously carried out the operations in Jolo. This can be seen in the March 28, 2021 edition with the headline "Suicide Bombers at Cathedral Church Affiliated with Terrorist Actions in the Philippines," and the March 29, 2021 edition, with the headline "Makassar Suicide Bombers Linked to JAD Network that Previously Operated in Jolo, Philippines."

4.2.4. Depictions

Kompas.com has a clear pattern in describing the various parties involved in the incident. The perpetrators are consistently described as "terrorists affiliated with a certain network," which creates the impression that the attack was organized and had a specific ideological motive. This can be seen in the March 28, 2021 edition with the headline "Suicide Bomber at Cathedral Church Affiliated with Terrorist Action in the Philippines," the March 29, 2021 edition with the headline "Makassar Suicide Bombers Belong to JAD Network that Previously Carried Out Attacks in Jolo, Philippines," and the March 29, 2021 edition with the headline "Makassar Suicide Bombers Were Married by Terrorist Suspect Who Died Last January."

Kompas.com also gave a positive portrayal of church security as "heroes" for their heroic actions in preventing a greater number of casualties. The security personnel attempted to stop the suicide bomber. This can be seen in the March 29, 2021, edition with the headline "Becoming a Hero: The Story of Kosmas, the Makassar Cathedral Church Security Guard Who Stopped the Suicide Bomber."

4.2.5. Visual Images

Visual components are an important element in the framing done by Kompas.com. The photos displayed generally show the damage to the church, providing visual evidence of the physical impact of the attack. Images of security forces on standby around the location are also often displayed, showing the state's response to the threat (Figs. 4 and 5) (Himawan & Gabrillin, 2021; Kamil & Krisiandi, 2021).

Interestingly, Kompas.com has a policy of not displaying photos of victims and perpetrators, demonstrating journalistic ethics that respect the privacy and dignity of those involved and affected by traumatic events. This is reinforced by the news report in the March 28, 2021 edition, which advises against disseminating photos or videos

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Fig. 4. Photographs of the church site and damage. Reused from Kamil and Krisiandi (2021) with permission of KOMPAS.com.



Fig. 5. Photograph of security forces on standby near Makassar Cathedral Church. Reused from Himawan and Gabrillin (2021) with permission of KOMPAS.com.

of the perpetrators and victims under the headline "Explosion at Makassar Cathedral Church—Mayor Danny: Do Not Upload Photos and Videos." Additionally, this can also be seen in the news article published on March 28, 2021, titled "Ministry of Communication and Information Technology Urges Netizens Not to Upload Videos of Suicide Bombing in Makassar."

4.2.6. Roots

In analyzing the root causes of the incident, Kompas.com consistently emphasized radicalism and intolerance as the leading root causes of the suicide bombing. Their reporting often linked the incident to acts of terrorism on Jolo Island in the Philippines, which is part of the JAD network. In addition, this media outlet highlights aspects of security and surveillance systems that need improvement, implying there are gaps in the prevention system that need addressing. This can be seen in a news article published on March 29, 2021, which reported that the TNI and the Polri were conducting security patrols at several crowded locations and places of worship.

4.2.7. Appeals to Principle

Kompas' reporting is permeated by strong moral claims, particularly emphasizing that religious tolerance is the foundation of the nation, which must not be shaken by acts of terrorism. This media source consistently voices calls to maintain unity and combat acts of terrorism. This was expressed by Zulkifli Hasan, Chairman of the National Mandate Party's Central Executive Board, as reported in the March 29, 2021 edition.

The principle of humanity is also often used as a basis for condemning these acts, emphasizing that violence in the name of anything is not justified by any religion and is contrary to the fundamental values upheld by civilized societies. The phrase "terrorist acts are not related to any religion" is emphasized in every news report. The phrase is similar to the statement by President Joko Widodo reported in the March 28, 2021 edition, which stated that "terrorism is a crime against humanity and is not related to any religion." This statement seems to emphasize that no religion justifies the actions of suicide bombers, including Islam, even though the perpetrators' motive was known to be jihad and they were prepared to die as martyrs. This is reinforced by the argument of the Chairman of the Democratic Party, Agus Harimurti Yudhoyono, in the March 29, 2021 edition, which emphasizes that "terrorism is the enemy of all religions, including Islam, which opposes the ideology and actions of terrorism." This emphasizes that the presence of Islam actually brings blessings to all and teaches the values of tolerance and respect for differences among fellow human beings.

4.2.8. Consequences

Kompas.com pays special attention to the various consequences arising from the Makassar incident. This media platform discusses its impact on government programs, particularly vaccination, as the incident coincided with the government's program to combat the COVID-19 pandemic and stabilize the economy. This can be seen in the March 29, 2021 edition with the headline "Erick Thohir Says Makassar Cathedral Bombing Could Disrupt Vaccination Program."

The consequences for worship activities were also highlighted, with concerns that similar incidents could occur at other places of worship, potentially causing tension

between religious communities if not appropriately managed. This was stated by Jakarta Deputy Governor Ahmad Riza Patria in the March 28, 2021 edition of the news, urging the public not to panic and to continue their worship activities as usual. He added that places of worship, including churches and other locations, would be guarded by joint personnel (Table 2).

Analysis of the framing strategies employed by Detik.com and Kompas.com in reporting the suicide bombing at Makassar Cathedral on March 28, 2021 reveals the complexity of the process of constructing social reality through the mass media. The results of this study show that the two media sites applied different but complementary framing strategies in shaping public understanding of the terrorist incident.

Based on Gamson and Modigliani's analytical framework, the construction of social reality by both media outlets shows how news does not merely reflect objective facts but involves complex processes of selection, interpretation, and representation. This is in line with the constructivist perspective put forward by Berger and Luckmann (1966), which states that social reality is the result of social construction involving processes of externalization, objectification, and internalization. The mass media, in this context, acts as the primary agent in the process of objectification, which is the process of transforming subjective views into widely accepted 'facts.' For example, in the Makassar Cathedral bombing, when the media consistently used a particular framing of the perpetrators' identity, this view was gradually accepted by the public as objective truth, rather than as the result of editorial choice.

The framing strategy applied by Detik.com shows a tendency to construct reality through dramatization and sensationalization. The use of metaphors such as "honeymoon" to describe the suicide bombing carried out by a married couple reflects the media's attempt to create a narrative that is easy to understand but has the potential to simplify the complexity of terrorist motivations. The concept of the "Batman trap" used to describe the radicalization process also shows how the media uses popular cultural references to make complex issues more accessible to mainstream audiences. Striking catchphrases such as "Terrorist Act No. 522" are also used to attract audience attention.

In contrast, Kompas.com adopts a more conservative approach in its construction of reality. The use of the metaphor "selling paradise" shows an effort to construct a reality that focuses more on the moral and spiritual dimensions of terrorism. This metaphor touches explicitly on the theological dimension by criticizing the misuse of religious concepts. This phrase constructs the reality that terrorism is the result of the distortion of spiritual teachings, not a representation of religion itself. The metaphor "angkara murka" (wrathful anger) also shows a more philosophical approach to understanding violence. This term comes from the Javanese tradition, which describes violence as a manifestation of moral and spiritual imbalance. By using this terminology, Kompas constructs terrorism not only as a criminal act but as a more fundamental moral crisis. The use of the catchphrase "Grief on Palm Sunday" shows Kompas' sensitivity to the sacred dimension of the event. This framing shows that terrorism not only destroys physical life but also destroys holy spaces and spiritual moments that are meaningful to the community.

Table 2. Framing analysis results (Kompas.com)

Framing devices		Reasoning devices	
Metaphors	Terrorism occurs because there are those who "sell heaven"; suicide bombings are "wrath"	Roots	Radicalism and intolerance; weak security and surveillance systems
Catchphrases	Grief on Palm Sunday	Appeals to principle	Maintaining unity and fighting acts of terrorism; violence is not justified by any religion, including Islam
Exemplars	The Makassar suicide bombing is similar to the bombing in Jolo, Philippines, which was carried out by a couple affiliated with JAD	Consequences	Disrupting the vaccination program to fight COVID-19 pandemic and concerns about carrying out worship activities
Depictions	Perpetrators as terrorists affiliated with JAD; church security as heroes		
Visual images	Photos of the location of the damage near the church and the authorities on standby near the church		

JAD, Jamaah Ansharut Daulah.

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Detik.com shows ambivalence in its representation of religious identity. On the one hand, this media site explicitly displays visual images that show the spiritual identity of the perpetrators through typical Muslim clothing such as skullcaps, turbans, veils, and headscarves. This visual representation has the potential to reinforce the association between Islamic religious symbols and acts of terrorism, which can contribute to the formation of negative stereotypes. On the other hand, in its reasoning devices Detik.com consistently emphasizes that "terrorism is not related to any religion," reflecting an effort to separate extremist acts from the representation of religion as a whole.

Kompas.com shows a more consistent approach in avoiding visual representations that could trigger religious stereotypes. The editorial decision to not show photos of perpetrators and victims reflects journalistic ethics that are more sensitive to the potential negative impact of visual representations. This approach reflects a more careful framing strategy in avoiding religious stereotypes while still criticizing extremist ideologies. This strategy aligns with the principles of peace journalism put forward by Galtung (2003), which emphasize the media's importance in promoting peace and avoiding representations that could exacerbate social conflict. This explains that the two media outlets use different legitimation strategies to construct the authority and credibility of their narratives.

Critically, we interpret that the media's construction of reality regarding the suicide bombing at the Makassar Cathedral has the potential to create "violence" against the Muslim community, especially Muslim women, in the context of the representation and social stigmatization that is developing in Indonesian society. The visual representation displayed by Detik.com, which explicitly shows the female perpetrator wearing a veil and an ample hijab covering her entire body, creates a visual association that has the potential to harm veiled Muslim women as a whole.

These findings can be analyzed through the lens of media bias, specifically the concept of visual framing bias (Fiveable Content Team, 2025). Although the media textually attempts to deconstruct narratives that link terrorism to a particular religion, the visual selection that shows the perpetrator wearing clothing that indicates her religious identity can create implicit bias that contradicts the textual narrative. Media bias in this case is also reflected in the inconsistency between the visual and narrative levels in the construction of news. The media faces a dilemma in balancing informative interests with ethical responsibilities, which ultimately results in contradictory messages.

This visual framing bias not only represents the perpetrators as individuals but also indirectly creates opportunities that can influence public perception of Muslims, especially the Muslim female community. Muslim women are considered more vulnerable to stigmatization, increased suspicion, discrimination, or even intimidation in public spaces because their religious identity is easily identifiable from their visual appearance, namely the use of the hijab and niqab (Iner & McManus, 2022).

Hefner (2011), in his study of civil Islam in Indonesia, explains that unbalanced media representation can threaten the traditions of tolerance and pluralism that have long developed in Indonesian society. Muslim women can become victims of this tension, experiencing alienation not only from non-Muslim communities but also from fellow Muslims who seek to distance themselves from the stigma of terrorism.

The temporal construction in the news coverage, which links the events to "Palm Sunday" and the Christian religious context, also creates a binary opposition between "innocent Christian victims" and "extremist Muslim perpetrators." This representation can reinforce the narrative of religious conflict, which has the potential to affect interfaith relations and place Muslim women in a position where they must constantly prove their commitment to tolerance and peace.

Therefore, the framing analysis of the reporting on the suicide bombing at the Makassar Cathedral reveals that media framing strategies have consequences that go far beyond the mere delivery of information, but can potentially influence perceptions and negative stigma towards specific religious communities and lead to the victimization of Muslim women in particular in Indonesia's plural and complex society. This is due to framing bias that displays photos of the perpetrator wearing religious identifiers such as a hijab and niqab.

Overall, the two media outlets studied were more careful in constructing news on sensitive issues, especially those related to religion, considering that Indonesia is a country with great religious diversity. Although one of the media sites showed bias in its reporting, both still attempted to create a framing pattern that separated "Islam" from "terrorism," a narrative that is rarely found with the same intensity in Western media. This characteristic shows that news framing in Indonesia still considers the specific local context, especially in harmonizing religious diversity.

5. CONCLUSION

The two media platforms apply different but complementary framing strategies. Detik.com uses a dramatization approach with sensational metaphors ("honeymoon," "Batman trap"), attention-grabbing catchphrases ("522nd Terrorist Attack," "Pregnant Female Bomber"), and visual images that display the religious identity of the perpetrators (niqab, hijab, peci, turban). In contrast, Kompas.com adopts a conservative approach with moral-spiritual metaphors ("selling paradise," "wrathful anger"), more sensitive framing ("Grief on Palm Sunday"), and an editorial policy of avoiding photos of perpetrators and victims. Despite their different strategies, both media sites consistently emphasize the deconstructive narrative that "terrorism is not related to any religion," a unique characteristic of Indonesian media that differs from Western media practices. However, there is a paradox in Detik's framing, which textually separates Islam from terrorism but visually reinforces the association through the representation of the perpetrators' religious identities.

The findings in this study also offer an important perspective on how the media in a Muslim-majority country with high religious diversity respond to terrorist events, which contrasts with the patterns found in Western media studies. Previous research shows that Western media tend to associate terrorism with a monolithic Muslim identity (Ahmed & Matthes, 2017; Powell, 2011). This contrasts with the findings of this study, which reveal that both Indonesian media outlets attempted to deconstruct narratives linking Islam with terrorism through their framing. Furthermore, this study can contribute to the international communication literature by showing that media in non-Western contexts can develop unique framing practices, such as explicit disclosures between terrorism and religion, which are not only locally relevant but also offer alternative models for global media ethics discussions on how to cover ideology-based events in religiously sensitive multicultural societies.

Based on the findings and discussion, this study indeed has limitations. The authors propose recommendations for further research that need to be considered, namely exploring the experiences of Muslim women as a manifestation of the narrative construction of terrorism in the media, especially in countries with Muslim-majority populations, which have so far been underrepresented in literature.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Voices from the Margin: Examining Digital Heritage through Madurese Poetry Independent Archival Initiatives

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ABSTRACT

Madurese poetry, often published in regional newspapers and written in the local language, represents a vital yet overlooked facet of Indonesia's literary heritage. Despite its cultural and historical significance, this body of work remains vulnerable to disappearance due to limited archiving infrastructures and the marginalization of regional voices within national narratives. This study investigates how independent archival initiatives, particularly the community-driven efforts of *Arsip Puisi Penyair Madura* and *Arsip Prosa Madura*, contribute to preserving and reviving the Madurese literary heritage. Using semi-structured interviews with two key informants and document and content analysis of community-managed digital platforms, this study examines how poets, readers, and community organizers understand the role of archives, their relationship with libraries, and the potential of digital technologies for preservation. The findings suggest that inclusive, participatory archiving models can bridge the gap between libraries and marginalized communities. This paper advocates for stronger collaborations between formal institutions and grassroots archives, urging libraries to embrace their role not only as repositories of knowledge but as active participants in cultural justice and heritage sustainability.

Keywords: Madurese poetry, digital heritage, independent archives, cultural preservation, community collaboration

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1. INTRODUCTION

Poetry has long served as a medium for cultural memory, resistance, and self-expression, particularly among marginalized communities whose voices are often underrepresented in formal archives. In Indonesia, poetry in the form of classical and contemporary styles has played an essential role in the voicing of Indonesian culture, history, and identity (Shaleh & Qurtuby, 2020). Despite the literary heritage being richly diverse, regional literary works such as Madurese poetry are rarely acknowledged in mainstream cultural policy or library collection development.

The Madurese people, predominantly residing in the island of Madura and parts of East Java, possess a vibrant oral and written tradition that blends folklore, resistance narratives, and Islamic values. Within Madurese communities, poetry functions as a key medium for cultural transmission, conveying moral instruction, historical memory, and collective identity across generations, particularly in contexts where oral and informal learning remains central. Madurese-language poetry serves as a fundamental pedagogical instrument within the *pesantren* (Islamic boarding school) milieu, facilitating the transmission of Islamic values and localized epistemologies across communal spheres. This literary form is deeply integrated into the educational fabric of these traditional institutions (Johns, 1979). Utilizing the *nadham* (rhymed prose) format, Madurese poetry is strategically employed to instruct specialized disciplines, thereby assisting in the cognitive retention of complex subjects such as *Fiqh* (jurisprudence) and *Akidah* (theology). The inherent melodic and rhythmic cadence of the *nazam* enhances mnemonic capabilities and conceptual comprehension. Furthermore, poetry is recognized as a versatile medium for *da'wah* (proselytization), as religious practitioners frequently leverage these poetic structures to articulate moral imperatives and spiritual values to their congregations (Johns, 1979).

The scholarly contributions of Badrus Shaleh, as referenced within this analysis, exemplify a dedicated commitment to the preservation of indigenous Madurese wisdom, utilizing poetic expression as an epistemological gateway. This investigation adopted an ethnographic methodology to foster an authentic engagement with the lived experiences and internal perspectives of the community participants (Shaleh & Qurtuby, 2020). Nevertheless, this reliance on specific scholarly works underscores a broader lacuna within formal academia, suggesting that Madurese poetry has yet to be fully integrated into mainstream literary historiography or wider digital humanities research.

The erosion of this poetic tradition therefore carries broader national implications, as it entails the loss of linguistic diversity, localized epistemologies, and region-specific modes of remembering that contribute to Indonesia's plural cultural heritage (Anderson, 2006). Yet, most of this creative output remains scattered across ephemeral media such as local newspapers or personal manuscripts, making preservation efforts exceedingly difficult. Despite Indonesia's wealth of intangible cultural heritage, much of its regional literary output is beyond the scope of the institutional radar. The National Library and university collections tend to prioritize canonical Indonesian literature, while literary works in local languages such as Madurese are marginalized or deemed peripheral. This forsaking raises serious concerns about linguistic justice, cultural equity, and the inclusive responsibilities of heritage institutions.

During the preceding decade, community-based archival initiatives have materialized as a response to the aforementioned lacunae within established archival collections. A notable exemplar of such endeavors, *Arsip Puisi Penyair Madura* (Archive of Madurese Poets' Poetry, abbreviated as APPM), was established by Madurese literary figures and cultural advocates who harbored concerns regarding the progressive effacement of their indigenous literary heritage. Concurrently, *Arsip Prosa Madura* (the Madurese Prose Archive, abbreviated as APM) has concentrated its efforts on the compilation of prose collections, thereby establishing a complementary repository of indigenous narratives. These autonomous archives, despite facing constraints pertaining to financial resources and infrastructural development, have nonetheless pioneered inventive methodologies for grassroots digitization, predominantly relying upon communal contributions and readily accessible digital tools.

Concurrently, academic discourse concerning decolonial archiving has experienced significant growth, largely driven by critical examinations of the inherent Eurocentric and centralized biases prevalent within established archival institutions. Prominent scholars, including Caswell et al. (2016) and Flinn et al. (2009), advocate for the adoption of a participatory and justice-oriented archival paradigm. This paradigm is posited to validate indigenous knowledge systems, foster community-led authorship, and fundamentally redefine the parameters of legitimate archival practice. The application of these conceptual frameworks to the Madurese context necessitates an introspection into the mechanisms through which independent archives contest prevailing archival power structures

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and reconfigure the domain of cultural preservation.

This study aims to explore the dynamics between independent archival initiatives and formal institutions, with a focus on how digital tools can enhance the preservation and accessibility of Madurese poetry. It seeks to answer the following questions: (1) What motivates community actors to archive Madurese poetry? (2) How do these actors perceive the role of libraries in supporting or ignoring their work? (3) What challenges and opportunities emerge in bridging independent archives with institutional infrastructures? This research is intended to contribute to the broader discourse on inclusive digital heritage by highlighting the intersections between poetry, identity, memory, and archival justice.

2. LITERATURE REVIEW

This research is situated within a broader scholarly discourse, engaging with several pivotal themes that critically inform its analytical framework: community archiving and the principles of archival justice, digital heritage and the implementation of participatory technologies, the imperative for preserving regional and vernacular literary traditions, the intersection of gender and authorship within independent literary production, and the ethical considerations inherent in collaborative archival methodologies.

2.1. Archival Justice and Participatory Documentation as Analytical Lens

Over recent years, scholarly discourse has increasingly focused on the pivotal role of community archives in fostering the democratization of memory and rectifying lacunae in representation within established archival institutions. Caswell et al. (2016) contend that archives ought not to function solely as inert repositories but rather as proactive facilitators of social justice, particularly when interacting with historically marginalized populations. This theoretical positioning shapes the analysis in three ways: first, by examining how Madurese poetry is positioned as legitimate cultural knowledge rather than folkloric curiosity; second, by investigating community autonomy in decisions about representation and access; and third, by understanding grassroots documentation as resistance to Jakarta-centric institutional paradigms (Flinn et al., 2009). Independent initiatives such as Irama Nusantara and the Indonesian Visual Art Archive offer important precedents for community-led documentation in Indonesia (Mrázek, 2018). These models illuminate how regional communities develop autonomous systems that challenge centralized narratives. Participatory archival frameworks (Bastian & Alexander, 2009) further enhance our comprehension of the ways in which community constituents influence the development of collections and the provision of access. This paradigm challenges conventional models wherein professional archivists serve as gatekeepers, thereby unveiling collaborative strategies that empower communities to govern the documentation of their own narratives (Gilliland et al., 2016).

The examination of archival websites, social media interactions, and event documentation seeks to identify these participatory mechanisms as they are realized in practice. In the context of Indonesia, the phenomena of archival marginalization are particularly evident. The centralization of cultural policy during the New Order regime (1966-1998) engendered enduring infrastructural biases, whereby national memory institutions located in Jakarta were consistently favored over regional archival endeavors (Ricklefs, 2008; Sunjayadi, 2012). This historical legacy continues to influence current archival environments, in which regional literary traditions encompassing languages such as Madurese, Sundanese, Javanese, and other indigenous tongues persistently remain underrepresented in national collections. Overall, community archives, including those scrutinized in this analysis, act not solely as instruments for conservation but also as conscious statements of opposition to overarching cultural control, upholding the legitimacy of local knowledge paradigms within a national landscape that has routinely marginalized them.

2.2. Digital Heritage Practices and Regional Literary Preservation

The concept of "heritage 2.0" (Giaccardi, 2012) frames the examination of digital archival platforms, positioning digital media as catalysts for co-creation and participatory documentation. The adoption of accessible platforms such as Instagram, WordPress, and community websites by Madurese archival initiatives exemplifies this democratization, allowing grassroots organizations to circumvent traditional gatekeeping while establishing direct audience connections (Huvila, 2008). However, concerns about "platform fragility" and dependency on commercial infrastructure remain relevant (Bastian, 2003; Ketelaar, 2001). The content analysis of digitized poems, social media communications, and metadata practices illuminates how community archives navigate tensions between accessibility and long-term sustainability, a balance that requires ongoing negotiation and adaptation.

The conspicuous lack of Madurese poetry in prominent Indonesian literary compilations and historical narratives (Kratz, 1996; Sudarmoko, 2021) offers critical contextual understanding. Academic examinations of the formation of the Indonesian literary canon reveal how institutional frameworks have prioritized publications originating in Jakarta that adhere to national literary criteria, consequently sidelining regional voices that utilize indigenous languages (Foulcher, 1990). Contemporary scholarship contests these established hierarchies by illuminating the complexity and richness inherent in regional literary customs (Hellwig, 1994). We perceive community-driven archival initiatives as intentional actions within literary historiography, shaped by recent advocacy for the incorporation of vernacular languages (Jaizul & Lestari, 2025). The notion of "born-digital heritage," cultural materials existing exclusively in digital formats (Duranti & Rogers, 2012), shapes our analytical approach to social media content and online publications. We examine how archivists blend traditional Madurese literary practices with digital affordances, creating what Miller and Slater (2000) term "digital vernaculars" that reflect processes of cultural translation and technological adaptation. This negotiation holds particular importance within the Indonesian milieu, where the proliferation of digital media has occurred alongside disparate levels of access, governance, and utilization across various regions. For community archives functioning in Madura, the utilization of user-friendly platforms such as Instagram and TikTok thus signifies not merely a technological selection but a pragmatic adaptation to these circumstances. In this context, leveraging the framework of data colonialism (Couldry & Mejias, 2019), these practices can be interpreted as endeavors to reclaim representational control within platform ecosystems that concurrently commodify cultural production.

2.3. Ethical Framework for Community Engagement

The "radical empathy" paradigm delineated by Caswell and Cifor (2016) directs the ethical considerations in this research, emphasizing the importance of relationality, informed consent, and acknowledgment of emotional labor during the processes of data collection and analysis. This perspective necessitates continuous reflexivity concerning the power dynamics that exist between researchers and community participants (Gilliland, 2014), particularly when investigating marginalized cultural practices. Indigenous data sovereignty principles (Carroll et al., 2020) underpin our protocols, aimed at honoring community ownership of cultural artifacts. Our choice to anonymize the identities of informants and aggregate interview outcomes embodies this commitment, thereby ensuring that archival practitioners maintain authority over the representation of their contributions. In the cases where perspectives notably diverge, we analytically separate contributions while upholding confidentiality.

Contemporary scholarship regarding collaborations between Indonesian institutions and communities indicates that effective partnerships necessitate cultural awareness, ongoing trust development, and an openness to re-evaluating traditional archival methodologies (Hasfera et al., 2023). These findings enlighten the dynamics between community archives and formal institutions, particularly in terms of co-curation opportunities and support frameworks. The notion of "archival hospitality" (Ketelaar, 2001) shapes our understanding of institutional relationships, highlighting the importance of reciprocal engagement and acknowledging that archives serve as arenas for power negotiation rather than impartial storage sites (Schwartz & Cook, 2002). We scrutinize the extent to which institutional representatives are willing to relinquish traditional gatekeeping roles, adopting distributed stewardship paradigms that recognize community expertise in the stewardship of cultural heritage. While not the central theme of this research, we acknowledge that the gendered aspects of archival labor and literary creation (Caswell & Cifor, 2016; Hatley, 2008) intersect with regional marginalization in ways that warrant further exploration, especially in light of the prevailing gender dynamics within Madurese literary contexts. This comprehensive framework positions the archiving of Madurese poetry as a vital locus for comprehending how marginalized cultural expressions can be preserved, digitized, and disseminated beyond traditional institutional confines.

2.4. Ethics and Institutional Collaboration

Ultimately, ethical considerations pertaining to collaborative endeavors remain pivotal within the domain of community archiving. As articulated by Caswell and Cifor (2016) in their exposition of the "radical empathy" framework, institutional-community partnerships necessitate the prioritization of relationality, informed consent, and the acknowledgement of emotional labor. Within the Indonesian context, Hasfera et al. (2023) have delineated a multifaceted scenario wherein libraries are progressively recognizing their imperative role in the preservation of indigenous heritage; however, successful collaboration mandates profound cultural sensitivity, the cultivation of enduring trust, and a fundamental re-evaluation of established archival practices.

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These instances underscore the paramount significance of co-curation and trust-building during engagement with community-owned cultural materials. By synthesizing insights derived from these five distinct scholarly trajectories, the present investigation positions the archiving of Madurese poetry as a critical locus for comprehending the mechanisms by which marginalized cultural production can be sustained, digitized, and disseminated beyond conventional institutional boundaries.

The implementation of ethical archival practices requires sustained attention to power dynamics that characterize relationships between formal institutions and community-based initiatives (Gilliland, 2014). Indigenous data sovereignty frameworks, as developed by Carroll et al. (2020), provide essential guidance for establishing collaborative protocols that respect community ownership and control over cultural heritage materials. These frameworks emphasize the importance of community-defined research priorities, benefit-sharing agreements, and the recognition of indigenous intellectual property rights that extend beyond conventional copyright protections.

Moreover, the concept of "archival hospitality," introduced by Derrida and Prenowitz (1995) and further developed by archival scholars such as Ketelaar (2001), offers a theoretical foundation for reimagining institutional relationships with marginalized communities. This framework emphasizes reciprocal engagement, cultural humility, and the recognition that archives are not neutral spaces but sites of ongoing power negotiation (Schwartz & Cook, 2002). Successful collaboration thus requires institutional willingness to cede traditional gatekeeping authority and embrace more distributed models of archival stewardship that acknowledge community expertise in managing their own cultural heritage.

The sustainability of ethical collaborations depends upon establishing transparent governance structures that ensure equitable participation in decision-making processes while maintaining accountability to community stakeholders (Stevens et al., 2010). By synthesizing insights derived from these five distinct scholarly trajectories, the present investigation highlights the archiving of Madurese poetry as a practical site for understanding how marginalized cultural practices can be sustained and digitized outside traditional archives.

3. METHODS

This study utilized a qualitative research methodology, drawing upon ethnographic and participatory frameworks. Its primary objective was to ascertain the underlying motivations, prevalent challenges, and future aspirations of community-based archival practitioners within the Madura region, alongside an examination of the interface between their endeavors and established archival institutions, such as libraries. Data acquisition was primarily facilitated through two distinct methods: semi-structured interviews and systematic content analysis of digital platforms, including Instagram and community-managed archival websites. The specific platform and materials analyzed include:

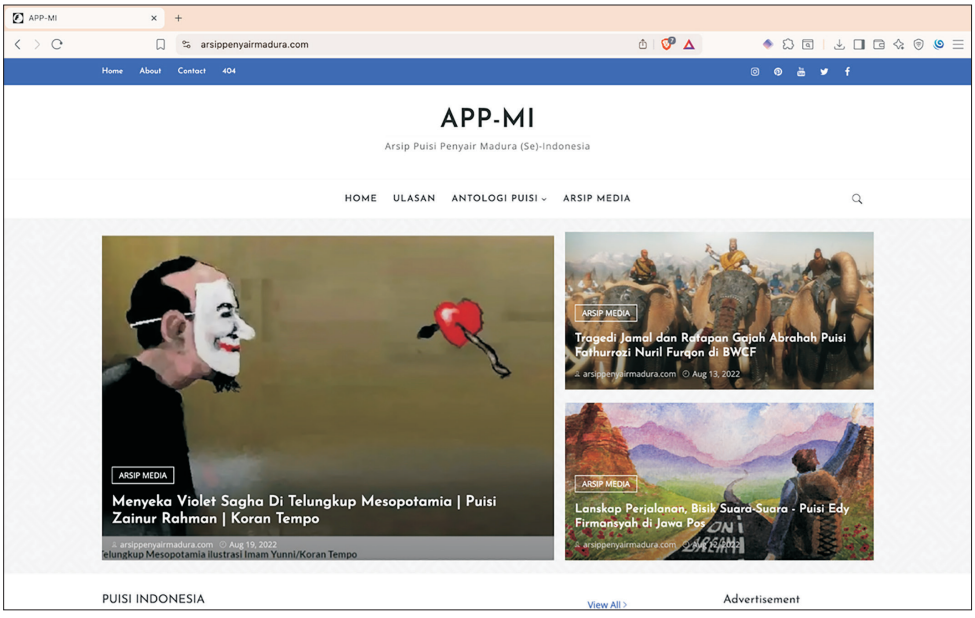


Fig. 1. *Arsip Puisi Penyair Madura* (Archive of Madurese Poets' Poetry) website screenshot; reproduced with permission.

- APPM website (www.arsippenyairmadura.com), which was accessible during the initial phase of data collection but was no longer available at the time of revision (last accessed July 2025; see Fig. 1 for the archival platform's interface).
- APPM Instagram account @arsippuisi_penyairmadura serving as a primary digital outreach channel (Fig. 2).
- APM Instagram account @arsipprosamadura utilized for community-driven content distribution (Fig. 3).
- APM TikTok account (www.tiktok.com/@arsipprosamadura).
- Digitized poems originally sourced from regional newspapers such as *Radar Madura* via the APPM website.
- Documentation of literary events and community activities shared through these platforms (e.g., photographs, event posters, and announcements).

Two key informants were meticulously selected via purposive sampling for interview participation. These informants were selected because they served as founders and primary coordinators of the respective archival initiatives, possessing decision-making authority and long-term involvement in collection, curation, and community engagement activities. Despite the limitation in the number of informants, this study does not aim for statistical generalization; rather, it underscores the concepts of transferability and analytical generalization (Yin & Campbell, 2018). The extensive expertise and thorough familiarity of these stakeholders enable the acquisition of nuanced, context-dependent insights that characterize qualitative case study analyses. These insights are not designed to epitomize all archival endeavors; rather, they shed light on broader dynamics such as community-driven preservation, utilization of digital platforms, and institutional marginalization that may be pertinent to analogous community archives, particularly those functioning within minority-language or Global South frameworks (Lincoln & Guba, 1985). The interviews were structured around an open-ended questionnaire, designed to elicit insights into pertinent themes, including perceptions of literary heritage, the integration of digital technologies, collaborative community engagement, and the efficacy of institutional support mechanisms. For privacy reasons, we combined the results of the interviews in the "Results and Discussion" section without mentioning specific informants. Some informants' information supported and reinforced each other's replies, except for cases where we separated them in the writing.

We also combined the results of these interviews with the theory of reinforcement. Complementary to the interview process, an analysis of archival documents was undertaken. The materials analyzed included: (1) digitized Madurese poems previously published in regional newspapers and literary anthologies; (2) content from archival websites managed by the initiatives; (3) social media posts published on Instagram; and (4) documentation of literary events and community activities. These sources offered valuable perspectives on archival methodologies, criteria for content selection, strategies for dissemination, and the formulation of informal metadata. These documents encompassed digitized poetic works previously published in newspapers, social media communications originating from independent archives, comprehensive event docu-

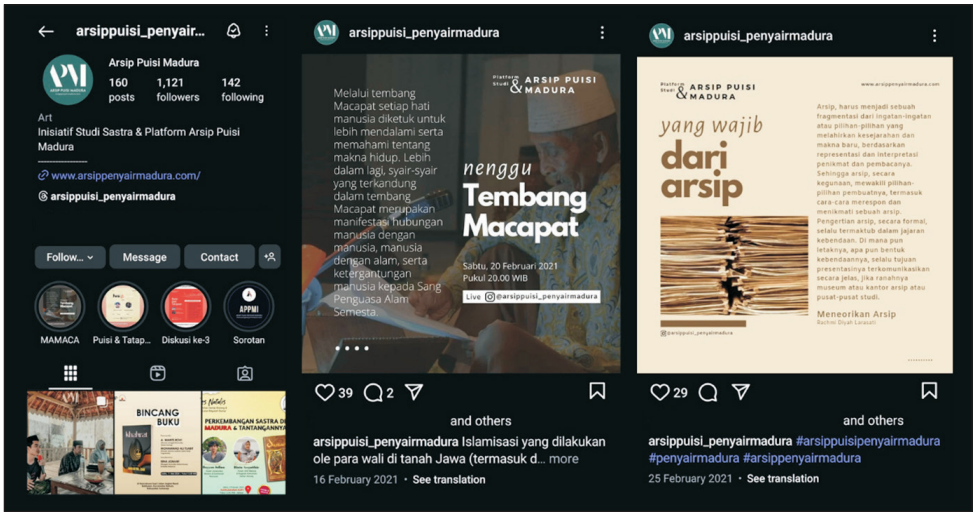


Fig. 2. *Arsip Puisi Penyair Madura* (Archive of Madurese Poets' Poetry) Instagram screenshot collage; reproduced with permission.

 https://doi.org/10.1633/JISTaP.2026.14.3.3

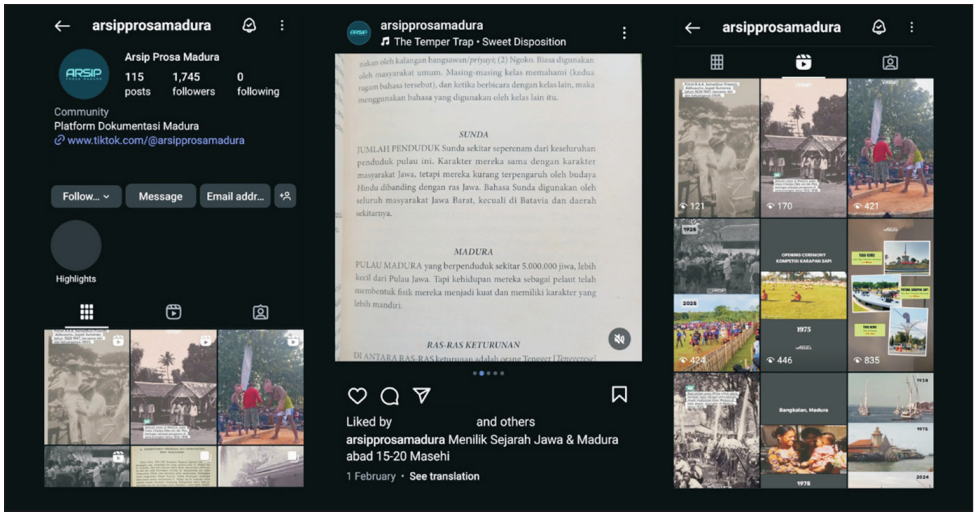


Fig. 3. *Arsip Prosa Madura* (the Madurese Prose Archive) Instagram screenshot collage; reproduced with permission.

mentation, and instances of informal metadata practices. These diverse sources afforded critical insights into the operational modalities of community archives, the methodologies employed for content categorization and dissemination, and the intricate interplay of these materials within the broader cultural ecosystem.

The collected data underwent systematic coding and thematic analysis, employing Braun and Clarke (2006)'s six-step method. Thematic development proceeded inductively, with particular emphasis placed on identifying recurring patterns across the varied perspectives of different stakeholders. Ethical considerations, encompassing informed consent, cultural sensitivity, and due recognition of intellectual contributions from community members, were rigorously observed throughout the research process. This study did not require formal institutional ethical approval. Verbal informed consent was obtained from all participants, and identifying information has been anonymized.

4. RESULTS AND DISCUSSION

Following data collection and analysis, four principal themes emerged regarding community efforts and perspectives on Madurese poetry archiving. These themes illuminate the motivations, challenges, and prospective pathways for collaboration between grassroots and institutional stakeholders. Each subsequent subsection delineates and examines these findings systematically. The study examined two independent archival initiatives: APPM and APM. While administered by distinct entities, both archives operate under a shared institutional vision. APPM is currently classified as dormant due to the cessation of content publication on its website platform and the redirection of its archivists toward alternative professional endeavors. Conversely, APM maintains operational continuity through active engagement on social media platforms, including Instagram and TikTok.

4.1. Motivations Behind Independent Archiving

APPM and APM demonstrate distinct motivational frameworks for conducting independent archival work. Despite their initial interconnection and the archivists' mutual acquaintance during the formative period, their respective endeavors subsequently diverged due to fundamental differences in the documentary formats they seek to preserve and disseminate. These motivations emerged clearly across interviews and internal documentation collected between July 29 (with APPM informant, in person) and August 5, 2023 (with APM informant, in person).

The establishment of APPM was precipitated by three principal factors. First, the intrinsic passion and personal commitment of the participating individuals served as a primary catalyst. Many of the key figures behind these initiatives are native to Madura and have been intellectually and emotionally shaped by literary environments such as *pesantren* (Islamic boarding schools), where exposure to classical and contemporary poetry is common. Their intimate familiarity with Madurese language, poetic forms, and cultural idioms cultivated a strong sense of obligation to safeguard these literary expressions from oblivion. As one archivist explained, "We grew up with these poems. They are part of how we understand ourselves. If we do not archive them, they will slowly disappear" (Informant 1, APPM). Their actions reflect what Flinn (2010) terms "archival activism," wherein personal identity and cultural

memory become catalysts for collective preservation.

Second, the initiatives sought to contest persistent stereotypes associated with Madurese identity. The archivists articulated concerns over reductive and often stigmatizing representations of Madurese communities, which were often characterized narrowly as involvement in violence, parochialism, or religiosity. According to one participant, "When people talk about Madura online, it is often negative. But we have literature, we have intellectual traditions. That side is rarely shown" (Informant 1, APPM). The emergence and documentation of Madurese literary works, particularly poetry, was deemed an appropriate mechanism through which to contest these reductive representations. By foregrounding literary production as a medium of cultural sophistication and nuance, these archives aim to reframe public discourse about Madura. The act of collecting and disseminating Madurese poetry thus becomes a form of representational resistance, a challenge to dominant narratives that marginalize regional cultural output (Caswell, 2014; Ketelaar, 2001).

Third, scholarly demand also constituted a pivotal factor. A burgeoning interest has been observed among researchers and educators concerning the epistemic dimensions inherent in Madurese poetry, given its encapsulation of the cognitive worldviews, moral philosophies, and historical memory pertinent to its communities. Nevertheless, the disparate and ephemeral character of these textual artifacts, frequently disseminated within short-lived local periodicals or confined to personal manuscripts, posed significant access barriers. As noted by the archivist, "Students and researchers often asked where they could find Madurese poems. There was no single place. Everything was fragmented" (Informant 1, APPM). Consequently, archivists undertook the development of specialized digital platforms designed to centralize these materials, thereby not only facilitating academic inquiry but also broadening public accessibility. These platforms fulfill a dual function: serving both as preservation tools and as pedagogical resources.

In the case of APM, the project similarly emerged from a critical awareness of the misrepresentation of Madurese identity in mainstream media, particularly on social platforms. The curators observed that digital portrayals often reinforce pejorative stereotypes, prompting them to utilize the same platforms, such as Instagram, as counter-archives. As stated by the APM archivist, "If social media is used to spread stereotypes, we can also use it to spread knowledge. It depends on how we use the platform" (Informant 2, APM). Their strategic engagement with digital media serves as a form of narrative reclamation and knowledge intervention, contributing to what Giaccardi (2012) calls "participatory heritage," where communities curate their own representations and histories.

Moreover, the initiative aims to address informational lacunae surrounding Madurese cultural and social history. By documenting oral histories, personal testimonies, and literary texts, the archive contributes to the reconstruction of underrepresented narratives that are often omitted from official historiographies. As one informant emphasized, "There are many stories about Madura that are never archived in official history. We want to record them before they are forgotten" (Informant 2, APM). In doing so, the archivists position their work within broader frameworks of cultural rights and epistemic justice, aligning with recent scholarship that views community archives not simply as repositories of memory but as instruments of counter-hegemonic knowledge production (Bastian, 2003; Caswell & Cifor, 2016).

4.2. Institutional Disconnect and Community Perception

The marginalization of Madurese literary heritage within Indonesia's formal cultural institutions reflects broader patterns of centralized knowledge production that privilege metropolitan perspectives over regional expressions. As argued by Foulcher (1990), national cultural institutions in Indonesia have historically demonstrated limited engagement with regional literature, particularly works published outside Jakarta or written in local languages. This institutional neglect extends to funding mechanisms, where cultural preservation grants typically require bureaucratic processes and institutional affiliations that effectively exclude grassroots initiatives. The absence of dedicated personnel with expertise in regional languages and literatures further compounds these challenges, creating systemic barriers that render Madurese cultural production invisible within official archival landscapes.

Interview data corroborate this structural condition. Participants consistently described unsuccessful attempts to seek institutional support. As one archivist explained, "We have tried to approach local institutions, but there has never been any concrete support for literary archiving. It is simply not considered a priority" (Informant 1, APPM). Another participant added, "Archiving poetry is seen as something that has no economic value, so it is often ignored in policy discussions" (Informant 2, APM). These accounts indicate that archival work related to regional literature is frequently perceived as culturally marginal and

economically unviable.

The sustained institutional disregard for Madurese literary traditions has engendered profound skepticism within community spheres concerning the preparedness or capability of official institutions to serve as reliable custodians of regional heritage. Governmental priorities predominantly converge upon nature-based tourism, affording negligible acknowledgment to intangible cultural contributions, such as poetic works or autonomous archival endeavors. Archivists affiliated with APPM and APM articulate considerable dissatisfaction regarding the paucity of financial endorsement and policy integration, observing that their preservation efforts remain peripheral to official policy and devoid of commercial incentive. Drawing on Stevens et al. (2010), this institutional oversight can be understood as being perceived by community members as encouraging a turn toward cultural self-determination, whereby autonomous archiving is regarded as both an imperative and a symbolic act of resistance against centralized cultural authority. As articulated by one archivist, "If we wait for institutions to take care of our literature, nothing will happen. So we decided to do it ourselves" (Informant 1, APPM). Public contestations regarding APPM's selection criteria further exemplify this dynamic; notwithstanding its volunteer-driven nature, the archive has been subjected to scrutiny for perceived omissions, thereby highlighting the intricate expectations imposed upon grassroots initiatives. Nevertheless, both APM and APPM maintain their dedication to their stated mission, prioritizing transparency and accessibility over institutional validation. Their concerted efforts parallel broader movements of regional cultural affirmation that repudiate Jakarta-centric narratives and advocate for locally governed memory practices.

The imperative of archival legitimacy frequently arises as a pivotal consideration for community-driven undertakings operating beyond established institutional paradigms, thereby necessitating the development of alternative validation models that critically interrogate conventional conceptualizations of professional competence and institutional prerogative. Both APPM and APM have cultivated their credibility through communal acknowledgement, engagement with scholars, and observed audience interaction on digital platforms, rather than through formal institutional endorsement. This phenomenon reflects what Bastian (2003) characterizes as an affective legitimacy, grounded in cultural resonance rather than bureaucratic sanction. These archival endeavors exemplify alternative benchmarks for archival practice, prioritizing cultural authenticity, communal accessibility, and grassroots involvement over formal professional qualifications and institutional affiliation. The inherent tension between amateur and professional archival standards is particularly accentuated within digital milieus, wherein technical proficiency and cultural acumen may command greater esteem than conventional archival pedagogy.

Historical attempts at collaboration between community archives and formal institutions have been characterized by structural incongruity and unbalanced power dynamics that ultimately undermined sustainable partnership models. Documentation reveals multiple instances where community archivists reached out to cultural institutions and university libraries seeking support or collaboration, only to encounter bureaucratic neglect or proposals that would subsume community initiatives under institutional control. One participant recalled, "There was interest, but the condition was that the archive would be managed under their institutional framework. We were not comfortable with losing control over our own materials" (Informant 2, APM). These experiences reflect broader tension concerning intellectual property, community consent, and cultural representation that reflect broader colonial legacies within Indonesian institutional structures (Reid, 2010). For many community archivists, the preservation of autonomy outweighs the pursuit of formal recognition. As another informant emphasized, "We prefer to remain independent rather than hand over our work and lose the spirit behind it" (Informant 1, APPM).

The adoption of digital platforms by community archives constitutes a strategic bypass of conventional institutional gatekeeping protocols, thereby facilitating unmediated interaction with diverse audiences while preserving cultural sovereignty and editorial prerogative. The selection between web-based repositories, herein referred to as Archival Platform Models, and social media platforms, designated as Archival Presence Models, signifies divergent epistemologies concerning accessibility, longevity, and audience participation. Each methodology presents distinct benefits for the community-directed dissemination of cultural heritage (Giaccardi, 2012). Digital technologies empower community archives to establish alternative organizational frameworks that operate in accordance with community-articulated standards rather than adhering to established professional archival methodologies, consequently fostering parallel systems of cultural conservation that contest the hegemonic influence of formal institutions. This process of digital disintermediation enables communities to circumvent traditional publishing

houses, libraries, and museums, concurrently forging direct relationships with scholars, pedagogues, and cultural aficionados who prioritize authentic regional perspectives over institutionally mediated representations. In relation to the second research question, these results reveal a persistent institutional disconnect that fosters skepticism among community archivists while simultaneously encouraging autonomous cultural preservation strategies.

4.3. Digital Tools as Enablers of Grassroots Innovation

Both APPM and APM operate on a voluntary, nonremunerative basis. As such, their archival strategies prioritize cost-effective and accessible digital platforms, with social media emerging as the preferred medium due to its free availability and wide reach. For these community-based archivists, such platforms offer both functional and logistical advantages, enabling them to engage in preservation activities despite limited financial resources. As one archivist explained, "This is purely voluntary work. We don't receive funding, so we rely on platforms that are free and easy to use" (Informant 1, APPM).

The APPM primarily acquires materials through digital sources, including online literary websites that feature Madurese poets, digital newspaper archives, and literary groups hosted on Facebook. Poems identified through these channels are manually transcribed and annotated with relevant metadata such as the date of publication and the source of origin. When poems are obtained from digital websites, archivists may enhance them with contextual illustrations while ensuring appropriate citation. In cases where the original format is a scanned newspaper or photographic documentation, the poem is retyped to ensure digital legibility and long-term access. As described by the archivist, "If we find a poem in an old newspaper scan, we retype it manually so it can be read clearly online" (Informant 1, APPM).

In terms of selection criteria, the APPM limits its archival scope to poems that have been previously published in print newspapers or poetry anthologies. The exclusion of unpublished manuscripts or magazine content is informed by a curatorial rationale: the belief that publication through formal media channels typically entails an editorial or peer-review process, thus serving as a proxy indicator of literary quality and cultural significance. As the archivist noted, "We only archive poems that have already been published in newspapers or books. That way, there has been an editorial process" (Informant 1, APPM).

Conversely, APM has adopted a more public-facing dissemination strategy, favoring platforms such as TikTok and Instagram. This choice is informed by two principal considerations. First, these platforms offer the potential for enhanced visibility and circulation, enabling Madurese narratives to be disseminated beyond localized audiences. As the archivist explained, "If we want people outside Madura to see our stories, we have to use platforms like Instagram and TikTok" (Informant 2, APM). In doing so, APM aims to challenge and subvert prevailing stereotypes of Madurese identity that often circulate on mainstream social media. According to the archivists, the use of algorithm-driven platforms enhances the capacity of these initiatives to reach audiences beyond the island of Madura, including diaspora communities and broader Indonesian publics. As the informant emphasized, "After posting, we received responses from people outside the island. That shows the reach is much wider" (Informant 2, APM).

Second, the audiovisual affordances of TikTok and Instagram offer dynamic and engaging modes of presentation. By incorporating photos, animations, and short-form video content, APM is able to communicate complex historical and cultural themes in a manner that is both accessible and contextually resonant. As articulated by the archivist, "Through short videos, we can explain history and literature in a way that feels closer to young audiences" (Informant 2, APM). These creative strategies not only increase user engagement but also provide an alternative pedagogical model for the transmission of regional knowledge. Ultimately, the strategic adoption of digital tools by both APPM and APM illustrates how community archives can innovate beyond the limitations of formal institutions to ensure the survival and accessibility of local cultural heritage. These practices show a broader transformation in archival logic, which shifted from static, institution-centered repositories toward more fluid, interactive, and community-responsive platforms. The success of these digital efforts underscores the need to recognize grassroots digital literacy not merely as a coping strategy but as a form of creative agency.

4.4. Pathways Toward Collaboration

Although APPM is no longer active, its initial efforts exemplify the potential of grassroots literary archiving to foster community engagement and build collaborative networks. During its formative period, APPM archivists conducted outreach trips across various districts in Madura, introducing APPM as an independent archival initiative. These field visits were instrumental in mapping the literary landscape of the region. As one archivist recalled,

"We visited several districts to introduce the archive and meet local writers directly" (Informant 1, APPM). They facilitated encounters with numerous local literary communities, which not only offered insights into the circulation of Madurese poetry but also contributed directly to the identification and collection of archival materials. As one participant observed, "From those meetings, we discovered many poems and writers we had not known before" (Informant 1, APPM). The archivists noted that APPM's presence was acknowledged through invitations to participate in literary events, signaling early forms of institutional and community recognition: "We were invited to several literary events, which showed that people recognized our work" (Informant 1, APPM).

In contrast, APM remains active and continues to expand its scope. The current archivist has expressed strong interest in fostering inter-community collaborations and participating in broader cultural platforms, including regional festivals. One of the aspirations articulated by the archivist involves documenting a "travel journal" that narrates the diverse cultural and historical dimensions of Madura. As expressed in the interview, "I want to create a kind of travel journal about Madura, telling stories about its culture, history, and people" (Informant 2, APM). This vision aligns with broader trends in cultural heritage work, which emphasize storytelling, mobility, and lived experience as vital components of community archiving.

A relevant point of reference is the *Festival Kesenian Yogyakarta* (Yogyakarta Art Festival, or abbreviated as FKY), an annual cultural event that brings together artists, community organizers, and independent initiatives from across Indonesia. FKY provides a decentralized, inclusive platform for showcasing regional art forms, including literature, oral traditions, and digital media. Its emphasis on inter-community collaboration and participatory formats offers a compelling model for how independent archives like APM might engage with wider audiences. By participating in such festivals, APM was able to situate Madurese literature within a national cultural dialogue, enhance the visibility of its archival efforts, and form symbiotic partnerships with other archival and artistic collectives. As the APM archivist expressed when discussing future plans, "We hope to join cultural festivals so Madurese literature can be part of a wider national conversation" (Informant 2, APM).

In this light, the potential for collaboration between APM and platforms such as FKY points to a promising trajectory. These alliances not only broaden the reach and sustainability of community archives but also contribute to a more pluralistic and decentralized national memory infrastructure. Building such pathways requires strategic alignment, institutional openness, and a shared commitment to cultural equity, values that resonate with the ethos of both APM and community-based festivals like FKY. Addressing the third research question, the present study finds that while structural and bureaucratic barriers hinder formal collaboration, digital platforms and cultural festivals present viable opportunities for bridging independent archives with broader institutional infrastructures. As one informant reflected, "Even if institutions are difficult to approach, digital platforms and festivals give us space to collaborate on our own terms" (Informant 2, APM).

4.5. Limitation

This research encompasses several constraints that merit recognition. Initially, the investigation was based on interviews conducted with merely two principal informants. Although both individuals were chosen for their crucial roles in establishing and overseeing the archival initiatives, their viewpoints may not comprehensively reflect the range of opinions present within the wider Madurese literary community. Moreover, the research depends on accessible digital records and publicly available online resources, which may not encompass the entirety of archival materials or offline methodologies. Certain materials might have been lost, remain unpublished, or were unavailable during the period of analysis. Lastly, as a qualitative case study concentrating on two community archives, the results are not designed to be extrapolated to all regional literary archives in Indonesia. Instead, they provide contextually specific insights into grassroots archival methodologies and institutional dynamics within the Madurese cultural framework.

5. CONCLUSION

This study has examined the emergence, practices, and institutional dynamics of two community archive initiatives, namely APPM and APM, that work to preserve Madurese literary heritage. Through qualitative analysis of interviews and content analysis, the research reveals several key findings. First, both archives exemplify grassroots responses to institutional neglect, mobilized by a combination of cultural attachment, scholarly necessity, and a desire to counter misrepresentations of Madurese identity. Their motivations are deeply attached to personal and collective commitments towards cultural self-determination,

which aligns with broader frameworks of archival activism and community-led heritage work.

Second, the study highlights how digital platforms serve as critical enablers for these archives. While APPM prefers curated repository-style models, APM adopts a participatory and public-facing strategy through TikTok and Instagram. These divergent approaches reflect different epistemologies of access, legitimacy, and audience engagement. Importantly, both demonstrate how digital tools can bypass institutional gatekeeping and facilitate affective, culturally resonant forms of memory work.

Third, the findings underscore the deep skepticism toward formal institutions and the pervasive sense of exclusion experienced by community archivists. This disconnect points to structural challenges in Indonesia's cultural infrastructure, where regional literary production is often marginalized within Jakarta-centric policy frameworks. Despite these barriers, APPM and APM have cultivated alternative models of archival legitimacy based on community validation, digital visibility, and scholarly use, thus redefining archival standards from the margins.

Lastly, the study explores possibilities for collaboration, especially through decentralized platforms such as the FKY, which can act as bridges between independent initiatives and broader cultural networks. These forms of alliance-building are essential for fostering cultural equity and expanding the reach of grassroots archives. The insights gained from APPM and APM indicate multiple avenues that require additional academic exploration. Subsequent inquiries should investigate the processes through which community archives manage transitions from active to dormant status, as evidenced by APPM's progression towards inactivity, prompting broader inquiries regarding the sustainability of volunteer-led initiatives and the significance of institutional support in averting archival discontinuity. Moreover, the gendered aspects of Madurese literary creation demand a more comprehensive examination, especially considering the male dominance observed within both archival and literary spheres as highlighted in this discourse. Additionally, the involvement of Madurese diaspora communities in promoting the preservation of vernacular languages underscores a largely overlooked facet that bears significant implications for understanding the extensive landscape of heritage management. This research underscores the urgent necessity for the establishment of more inclusive financial frameworks that bolster independent archival endeavors. Initiatives such as *Dana Indonesiana* should consider the formulation of flexible, non-bureaucratic funding pathways to more effectively endorse grassroots cultural initiatives, which are often sidelined by formal institutional requirements. Furthermore, libraries and cultural organizations ought to reevaluate their roles, transitioning from subsumptive models whereby community efforts are assimilated under institutional control towards co-stewardship paradigms that maintain community autonomy while providing infrastructural and technical support. Libraries and cultural institutions must rethink their roles, not simply as repositories, but as co-creators, facilitators, and ethical partners in community memory-making. By embracing these alternative practices, Indonesia can move toward a more inclusive and just archival future.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Does it Matter? A Reflection from Network Analysis of the Voice of Library Users

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ABSTRACT

This study examines key factors influencing university library users' experiences. User-generated comments (UGCs) were determined as the source of the users' feedback. UGCs were collected from four Thai university libraries from 2022 to 2024, totaling 983 comments. After text cleaning (removing special characters, emojis, and URLs), 960 UGCs were obtained for analysis. The researchers separated the text into sentences and defined types and themes for UGCs. Finally, 1,108 UGCs were used for descriptive analysis and epistemic network analysis, and 196 comments were used for sentiment analysis. It was found that facilities and infrastructure were the most highly mentioned issues. University C's users showed the highest dissatisfaction regarding basic facility needs. University B's users emphasized additional resources. Additionally, this study illustrated the importance of service quality and human-centered support. It was revealed that 65.31% of users were positive about the library staff and services. This study suggested that libraries should be flexible, user-friendly, accessible, and attentive by using analytical tools to monitor real-time feedback for effective improvement. Well-managed university libraries should provide physical and digital services while maintaining personalized, responsive, and adaptive practices to support academic activities.

Keywords: voice of the customer, library service, user complaints and compliments, epistemic network analysis, sentiment analysis

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1. INTRODUCTION

The main mission of a university library is to support the university's activities, for instance, teaching and learning, research, and academic services. Specifically, the library aims to facilitate users' access to various up-to-date information. Recently, users' behaviors have changed due to the advancement of technology and the dynamics of society; therefore, the library has to adapt itself to meet new inquiries. Gathering user feedback will be an effective way to enhance the library services, aligning with its users' needs.

Gathering library user feedback refers to a process of collecting and analyzing users' needs, expectations, and challenges according to their experiences. Some users who are satisfied with the services tend to show their appreciation; meanwhile, those who are not satisfied with the services tend to give complaints or suggestions. This feedback is considered valuable data for improving the library services. Khaznadar and Ali (2025) mentioned that user satisfaction increased when libraries offered well-designed infrastructure and accessible locations. Similarly, Yaylali-Yildiz et al. (2022) found that a library building's design could represent human-scale proportions and spatial harmony with surroundings in order to promote accessibility. Further, learning space services help to maintain users' loyalty (Lacey, 2012).

More studies on user feedback have been in the fields of business, marketing, and service development. For example, Amoozad Mahdiraji et al. (2022) explored the feedback of customers in the automotive industry. Alowad et al. (2021) investigated issues related to access to hospital services and the time that patients spend in emergency rooms, using customer feedback and the voice of the process. Bocskull and Sungtong (2023) proposed a way to gather user feedback to use in a quality assurance system in basic education institutions. The complaint behaviors while using public libraries (Suki, 2010) and academic institution libraries (Oh et al., 2018) have been explored.

The situation of library usage behavior, emphasizing digital information services over in-person library visits, combined with digital communication and feedback, enables libraries to access user opinions and feelings expressed via social media networks, as well as complaints/feedback on digital platforms. This allows libraries to better comprehend customer input than traditional approaches like satisfaction surveys or complaint analysis, which can have constraints in question structure and sample size. Advances in natural language processing (NLP) allow libraries to conduct more in-depth analyses of user opinions and emotions. However, such analysis frequently focuses on categorizing emotions into discrete data units and has limitations in defining the structural links between library experience, library components, and user emotions. In this context, techniques like epistemic network analysis (ENA) are gaining popularity because they can show the relationships between user concepts, experiences, and emotions inside knowledge network structures (Williamson Shaffer & Ruis, 2017). As a result, ENA analyzes data relationships to provide a more systematic and profound understanding of the structure of library user experiences and feelings in a digital environment.

University libraries in Thailand have undergone an innovative transformation era, especially after COVID-19. They shifted to digital platforms to expand library services by allowing users to access resources anywhere and anytime. Nevertheless, current services are provided according to the perspectives of libraries, not users. Employing sentiment analysis on feedback shows great attention to meeting users' expectations. As a result, this study focuses on analyzing users' feedback on university libraries with sentiment analysis; thus, practical insights and guidelines for improving university library services are expected.

2. RESEARCH QUESTIONS AND OBJECTIVES

2.1. Research Questions

1) What are the voices of university library users towards library services?

2) Which issues regarding library services receive the most comments from users?

3) What is the structure of the relationship between the types of comments (complaints, suggestions, compliments) and issues related to library services?

4) How do the opinions of library users affiliated with universities in different contexts differ?

2.2. Research Objectives

1) To analyze the voices of university library users using sentiment analysis techniques.

2) To categorize user opinions into complaints, suggestions, and compliments related to library services.

3) To analyze the relationship between library service issues and types of user opinions using epistemological network analysis.

4) To compare the patterns of user opinions and experiences across multiple university libraries to reflect the unique characteristics of different library service models.

3. LITERATURE REVIEW

3.1. Customer Complaints and Compliments

Adeniran (2024) mentioned that user complaints help libraries to learn and respond to concerns promptly. In a sense, studying complaints and compliments is under the concept of the voice of the customer (VOC). This has been applied in business to detail a process of collecting and analyzing customer needs and experiences. VOC is considered an important technique for product and service development. Ulwick (2002) stated that gathering the VOC assists organizations in understanding customers' perspectives. This helps organizations to enhance the quality of products and services that meet the needs of the customers.

The VOC process usually comprises gathering and analyzing customers' opinions, expectations, and suggestions for product and service development. To apply the VOC in the context of university libraries, it could contribute to the service quality. Feedback could be gathered from various domains, for instance, surveys or interviews. It may consist of positive and negative feedback. Oh et al. (2018) studied library user complaints and classified them into five main categories: (1) inadequacies in library collections, (2) library environment and facilities (including location, cleanliness, and temperature), (3) service-related issues and procedural errors, (4) staff competence and service attitude, and (5) other miscellaneous issues. Customer complaints are based on dissatisfaction with a product or service. These complaints could be managed with effective methods and turn those users into loyal ones. As highlighted by Schoefer (2008), users who placed complaints potentially return to use the services if the complaints were resolved effectively. Further, negative word-of-mouth actions, including online complaints, have been commonly seen due to convenient accessibility and low cost. Online responses can influence some users' decision-making in choosing a product or service. On the other hand, compliments refer to positive evaluation and intend to create an impression and satisfaction.

Positive and negative feedback provides fruitful insights regarding users' perceptions of using library services. Adeniran (2024) said that to reach the highest level of user satisfaction, continuous service quality improvement is essential. Systematic complaint management may foster user loyalty and service utilization. By the same token, Reyes (2019) stated that it was important to conduct regular user satisfaction assessments and implement complaint management. A standardized, timely, and professional system for managing complaints was employed to enhance user satisfaction and institutional credibility (Reyes, 2019). Furthermore, according to Reyes (2019), user complaints should be considered as positive feedback since those were for improvement, not criticisms.

All in all, customer complaints and compliments are important indicators of service quality, showing strengths and weaknesses. These could contribute to improving overall service quality; hence, having the VOC as the main channel for gathering library user feedback is essential. Feedback tends to provide guidelines for additional service improvement of university libraries. However, when feedback is collected on a large scale, particularly through online platforms, manual interpretation becomes challenging. Therefore, systematic analytical approaches are required to interpret large volumes of user feedback and uncover patterns in user experiences. One such approach is sentiment analysis, which enables the identification of emotional orientations expressed in user comments.

3.2. Sentiment Analysis

Sentiment analysis, also referred to as opinion mining, is a computational technique to identify, extract, and evaluate information expressed in text form. It involves the NLP concept, computational linguistics, and text analytics to categorize attitudes as follows: positive, negative, or neutral. The technique has been applied in social media comments, emails, and customer conversation records, where organizations analyze and interpret data to develop or improve their products or services. Sentiment analysis implementation may involve lexicon-based approaches, rule-based models, or machine learning algorithms (Nawaz, 2023).

Sentiment analysis provides a systematic way to capture the affective dimension from the VOC. As mentioned, the VOC captures the experiences of the users. Using sentiment analysis enables us to reveal how users emotionally evaluate services and interactions. By analyzing the emotional tone embedded in user comments, organizations can better understand satisfaction, frustration, and appreciation related to different service components.

Sentiment analysis has been applied in several studies examining library services. For example, Ning (2025) implemented a visual feedback method called photovoice to investigate how university libraries in Hong Kong assist the cultural adjustment of mainland Chinese students and their emotional engagement with library spaces. It revealed that students were satisfied with libraries' services in terms of privacy and freedom, helping them ease feel-

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ings of loneliness and discomfort in public spaces. However, students' strong emotional attachment intensified academic stress and anxiety from time to time. The study emphasizes the importance of acknowledging the emotional and psychological dimensions of library use and providing helpful tips for developing policies that enhance cross-cultural adaptation among international students.

Similarly, Guo et al. (2024) gathered data from Dianping.com to identify pain points for 20 Chinese public libraries by employing a sentiment lexicon to classify user feedback. The results reported 84% of users' satisfaction regarding the services provided, while negative comments mostly concerned issues related to noise levels, seating availability, and service quality. The sentiments were grouped into six domains: user services, spatial experiences, library location, information resources, facilities, and librarian support. This study shows how sentiment analysis can classify specific service areas requiring improvement to respond to user expectations.

Additionally, sentiment analysis can also inform strategic library management decisions. As suggested by Papachristopoulos et al. (2019), libraries could make use of sentiment analysis to better understand and respond to user preferences and expectations. Moreover, Nurmalasari et al. (2024) assess sentiment classification accuracy from student and faculty feedback at Politeknik Caltex Riau from 2018 to 2023 using the Valence Aware Dictionary and sEntiment Reasoner sentiment analysis tool combined with tokenization, filtering techniques, Naïve Bayes, support vector machine, and Random Forest. It was found that there was high overall user satisfaction, including positive sentiments regarding comfort and accessibility, and negative sentiments in terms of Wi-Fi speed, collection adequacy, and facility maintenance. The findings illustrate the use of sentiment analysis as evidence for improvements in library services through large-scale data.

Even though sentiment analysis is capable of identifying emotional issues, it may overlook the relationships between different aspects of the user experience, such as how complaints about facilities relate to staff interactions or service processes. Therefore, complementary analytical approaches are needed to explore how different themes within user feedback are interconnected. One such approach is ENA.

3.3. Epistemic Network Analysis

ENA refers to a contemporary analytic technique to model and quantify relationships among coded data. More importantly, text or discourse data is coded into meaningful categories, and ENA shows the same patterns of the codes of the whole structure. Each node represents a specific theme, representing the frequency of the theme's occurrence. ENA illustrates how constructs are connected within a dataset. Previous studies showed ENA's effectiveness in interpreting learning behaviors. Zörgő and Peters' (2022) study also examined the interaction patterns and communication dynamics of students. One of the key features is constructing a network model within a shared space. The shared space enables researchers to compare network structures and assess the differences in patterns. Further, researchers can revisit the original data linked to each connection, which shows interpretive depth and analytical transparency.

ENA may be useful in analyzing conversational and collaborative data. For instance, Csanadi et al. (2018) applied ENA to explore problem-solving strategies. It revealed that there were differences in how participants coordinated and shared knowledge. In addition, Yan et al. (2022) employed ENA to model relationships among activities, including key learning tasks, to indicate patterns of teamwork associated with distinct performance outcomes. Moreover, ENA has been integrated with NLP to analyze student conversations across various domains. This integration leverages the ability to gather cognitive and interactional processes in a large dataset.

Despite its growing application in learning analytics and discourse analysis, the use of ENA for analyzing library user feedback remains limited. Within the VOC framework, ENA offers a way to examine how different aspects of library services relate to one another, such as facilities, staff interactions, and service quality. These aspects are often discussed together in user comments. By modeling relationships among feedback themes and comment types, ENA provides a relational perspective on user experiences within the broader library service ecosystem. This approach complements sentiment analysis by revealing how different components of user feedback interact within the discourse of library users.

4. RESEARCH METHODOLOGY

4.1. Data

The data were collected from the library Facebook page posts of four main Thai university libraries from 2022 to 2024. The universities are in different parts of the country and are anonymized as University A to D, as shown in Table 1.

University A is in the north of Thailand. The univer-

sity has approximately 5% international students and 4% international staff. The university's library strategy focuses on digital innovation and services that support academics and research, as well as prioritizing infrastructure development and sustainable environmental management. The university has adopted several management systems, including the library's VOC system, which gathered 530 user feedback items for analysis.

University B represents a university library located in the capital of Thailand, which is recognized as a leading research institution with about 5% international students and staff. Its main mission is to disseminate documents and research with a commitment to user-centered service. This library has created user experiences through library tours and has established partnerships with neighboring university libraries in Bangkok and the surrounding provinces by sharing library resources. A total of 179 user feedback items were collected through the library's VOC system.

University C is located in the northeastern region. It is a regional research university with approximately 2.5% international students and 4% international staff. This university library focuses on providing learning spaces for users to generate knowledge and innovation and promote lifelong learning. The library is developing processes to enhance the modernity and accessibility of the library without limits. This involves implementing a user relationship management strategy, focusing on public relations through social media and online services through the library platform. A total of 110 user feedback items were collected from the library's VOC system.

University D is located in the southern region. It is a regional research university with an important mission to serve a culturally diverse community, including 1.8% international students and 4% international staff. The library focuses on developing a variety of information resources, both physical and digital. The library aims to transform the library space and environment into a learning space, including developing a learning park for users of all ages. The library prioritizes the development of knowledge and digital repositories, resulting in it having the highest number of systems, databases, and repositories among the four institutions studied. A total of 164 comments were initially retrieved from the library's VOC system and its official Facebook page for analysis.

Table 1. Count of comments of library users (own data description)

University library	Data source	Count of comments
University A	Library's VOC system (university's self-managed system)	530
University B	Library's VOC system (university's self-managed system)	179
University C	Library's VOC system (university's self-managed system)	110
University D	Library's VOC system (university's self-managed system) and Facebook fanpage	164
Total		983

Note: The original raw dataset prior to cleaning.
VOC, voice of the customer.

4.2. Data Analysis

Data cleaning was conducted to remove noise from the initial dataset. This is done by manually reading through all comments and removing comments that were not meaningful or non-classifiable from the dataset, such as symbolic, single-word comments, such as 'sleepy' and 'indifferent.' The steps for data cleaning are as follows:

1) Data profiling: This involves studying the characteristics of the dataset and identifying potential problems, such as checking for missing values, duplicate data, and the length of complaint messages. Afterward, the researcher filters the data. If a field is found to be empty or lacks sufficient content for analysis, the researcher filters and removes that data from the dataset.

2) Text cleaning: This is done using basic text processing techniques, such as removing special characters, emojis, and URLs from the text, to retain only meaningful content for sentiment analysis. In the data cleaning process, the result is that the total number of comments from library users has decreased to 960 entries.

After data cleaning, duplicate content is removed by using text-based duplicate detection techniques, such as comparing text in the complaint detail field, since users may submit the same complaint multiple times or due to system errors. There are only 196 entries remaining for sentiment analysis (Fig. 1).

After the data cleaning process, researchers worked together to divide the "comments" into "sub-comments" based on the specific issues mentioned to ensure that the labeling was meaningful and clearly reflected the essence of the messages. For example, 'clean bathroom and cool air conditioning' was separated into 'clean bathroom' and 'cool air conditioning.' Following this, two researchers initially independently determined the types of comments and labeled the themes of the comments on the same dataset.

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Fig. 1. The process of descriptive analysis and ENA (own data processing).

Table 2. Defining type and theme of comment (own data processing)

Labels		Descriptions
Type	Suggestion	Users aim to provide a suggestion for further improvement without critiquing the current situation
	Complaint	Users left criticism or grievance comments
	Compliment	Users aim to thank or praise the library or reflect on their grateful feelings
Theme	Service	The comments focused on the services or experiences of receiving the services offered by the library
	Facilities	The comments focused on other utilities and facilities of the library, such as air conditioning and other electronic devices
	Resource	The comments focused on the main library resources available in the library, such as books, e-books, multimedia files, etc.
	Staff	The comments mentioned library staff, including the librarian, housekeeping, and other service staff
	User	The comments mentioned other users who received the library services at the same time
	Activities and events	The comments mention activities and events hosted by the library in its space
	Buildings and infrastructure	The comments focused on the library's infrastructure and physical building

The inter-coder reliability value of 92.70% was found, indicating a high level of agreement. For the disagreement comments, an additional researcher was brought in to review, discuss, and jointly decide on the codes until a consensus was reached. This resulted in a final dataset of 1,108 comments for analysis. The comments were classified by their purpose into three types: suggestions, complaints, and compliments. Meanwhile, the themes were categorized based on the topics mentioned by users, including service, facilities, resources, staff, users, activities and events, and building and infrastructure, the details of which are summarized in Table 2.

In this study, ENA was employed to analyze data, utilizing the ENA Web Tool (version 1.7.0; University of Wisconsin-Madison, Madison, WI, USA). The ENA algorithm constructs network models by identifying units of analysis, conversion, and code. The unit of analysis was defined as all lines of comments associated with a single university in a given year. Therefore, each analytical unit represented the aggregated set of comments submitted to a particular university library during a specific year (such as University A–2022). The conversations define the boundaries within which coded elements can co-occur. In this study, each individual comment line was treated as a conversational segment within the broader university-year unit. Co-occurrence relationships were therefore constructed by aggregating coded elements across multiple comment lines within the same university-year context. This approach enables ENA to construct how different types of feedback and themes are associated within the broader discourse of a particular library during a given period. Codes were divided into two types, including:

- Types of comments that capture the communicative intent of the feedback. This could be categorized into three types, including suggestions, complaints, and compliments.
- Themes of the comments refer to the service aspect addressed in the content written by library users. These themes include activities and events, buildings and infrastructure, facilities, staff, services, resources, and users.

Although each individual comment was assigned a primary comment type and theme, ENA was used to ex-

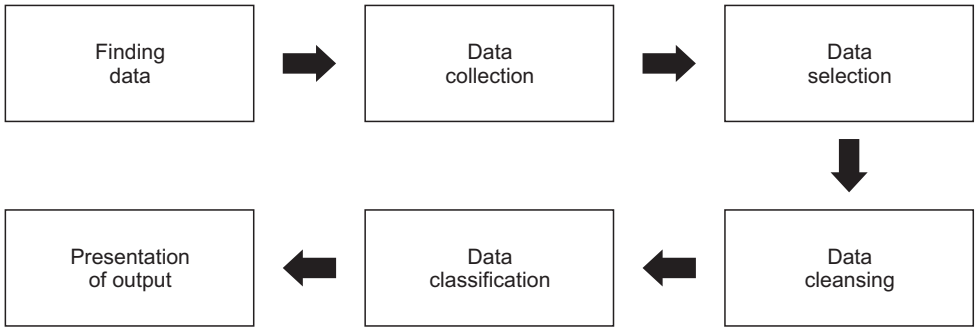


Fig. 2. Research method of sentiment analysis (Kewsuwun & Kajornkasirat, 2022).

amine how these coded categories collectively co-occur across the corpus of comments within each university-year unit. Therefore, the analysis focuses not on individual comments but on the broader structure of user feedback within institutional contexts. This approach enables the identification of dominant associations between types of feedback and service aspects across libraries and time periods, providing a relational perspective that complements descriptive cross-tabulation.

The moving window was set to one line, encompassing the current line and no other preceding lines (Siebert-Evenstone et al., 2017). The collecting method employs a binary summation approach as a co-occurrence of a code in each given line. The line is recorded as presence (1) or absence (0) instead of frequency. The networks were standardized to account for variations. Then, dimensionality reduction was performed by singular value decomposition to maximize variance within the dataset in orthogonal dimensions, as can be observed in Williamson Shaffer and Ruis (2017) and Fang et al. (2024).

The developed structure is portrayed by a network graph, with nodes representing individual codes and edges representing the relative frequency of co-occurrence between codes. Each unit is categorized into two coordinated visual components: (1) plotted points in a reduced-dimensional space, referring to the overall location of the unit's network, and (2) a weighted network graph, indicating the co-occurrence relationship between codes. The spatial location of network graph nodes is identified by an optimization procedure that is designed to minimize the discrepancy between the plotted points and the corresponding network center.

Besides using ENA, sentiment analysis of the comments was conducted using the Naive Bayes classifier. To analyze the data, the procedures proposed by Kewsuwun and Kajornkasirat (2022) were adopted (Fig. 2). This process involved locating data, gathering it, choosing it, cleaning it, classifying it, and presenting the findings.

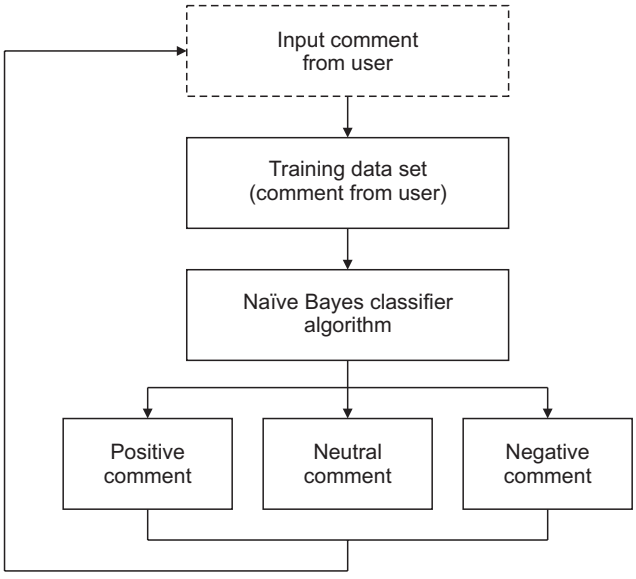


Fig. 3. Sentiment analysis process (own data processing).

Steps 1 and 3 were performed as presented earlier. However, in the data cleansing process, additional removal was done. This includes deletion of comments that were redundant, irrelevant, and incomplete. Additional comments that included publishing images, tagging other people's names, responding with emoticons, being difficult to understand, or using any language other than Thai were all removed. As a result, only 196 comments remained after cleaning. Then, a data classification was performed to analyze and gather opinions in Thai. This step began with the separation of data into training and test cases to teach the algorithm to learn the comments. The dataset was trained using the Naive Bayes classifier technique by using a library for sentiment analysis in Python from Bromberg and Lima (2013) (Fig. 3).

The process of data cleaning for sentiment analysis began with a manual review of the dataset. The researcher collected a total of 1,108 user comments and organized them in an Excel file (version Office 365; Microsoft, Madi-

son, WI, USA), categorized by university and comment type. Each comment was first examined, and related data was selected for each university by quick reading. As such, only potentially meaningful user comments were retained for the following analytical step. A comprehensive data cleaning process was then carried out after completion of the initial review to remove redundant and irrelevant data, including, for example, short phrases such as "Buy more books," "Good," and "The air-conditioning is cool." In addition, content that was not related was excluded, such as "555" (a laughing expression in Thai), political references, or incomplete codes, for example, "Buy chairs," "Thirsty," "Not fierce," and "Sullen face." Furthermore, tagged usernames, image posts, special characters (e.g., "@," "#," "^^"), and emoji icons (e.g., "*," "😖😑😢😐") were eliminated so that there was no redundancy or at least the smallest redundancy and minimal errors during sentiment analysis, thereby increasing analytical accuracy. It was found, moreover, that many users' symbols or expressions were ambiguous or even contrary to the contents in their texts—e.g., a comment that contained a positive idea was accompanied by emojis that expressed negative emotions.

Following the data cleaning process, there were only 196 comments remaining in the dataset, which was suitable for sentiment analysis. Cross-checking was done with the comment types and university categories to verify and ensure the accuracy of data classification and consistency. Next, the researcher analyzed the now clean dataset by using a Naive Bayes classification algorithm for binary sentiment analysis in Python, based on the approach by Bromberg and Lima (2013). Consequently, the Thai-language user comments could possibly be systematically analyzed and interpreted. The final step was to design the results in absolute numbers and percentages by classifying them into positive and negative sentiments. This structured presentation allowed for clearer interpretation and facilitated comparison across different universities.

The results of the classification process are presented in two formats: 1) display the number counts and percentages of positive, neutral, and negative comments, and 2) present the top three positive, neutral, and negative results based on keyword search (Fig. 3).

To summarize the overall picture of data analysis and datasets used in this study, Fig. 4 presents data-processing pipelines and the three analytical datasets used in this study. Dataset 1 shows the original raw comments (n=983). To examine the institution-level using ENA, the dataset was expanded with sub-comments. Therefore, dataset 2 was expanded to 1,108 comments. The descriptive analysis and ENA were analyzed using this dataset as presented in Sections 4.1-4.2. Due to the standard process of using sentiment analysis, the dataset underwent a further cleaning process. As a result, dataset 3 was reduced to 196 comments. This result was presented in Section 4.2.

5. RESULTS

5.1. General Information About Comments from Library Users

After data processing, there were a total of 1,108 comments (refer to dataset 2) from library users used in this analysis. When classified by year, 2023 had the highest count of comments with 492 comments (44.40%), followed by 2022 with 344 comments (31.04%), and 2024 with 272 comments (24.56%).

When divided based on universities (Fig. 5), it can be seen that University A had the highest frequency of comments, containing 585 comments (52.80%), followed by University D with 229 comments (20.66%), University B with 181 comments (16.34%), and University C with 113

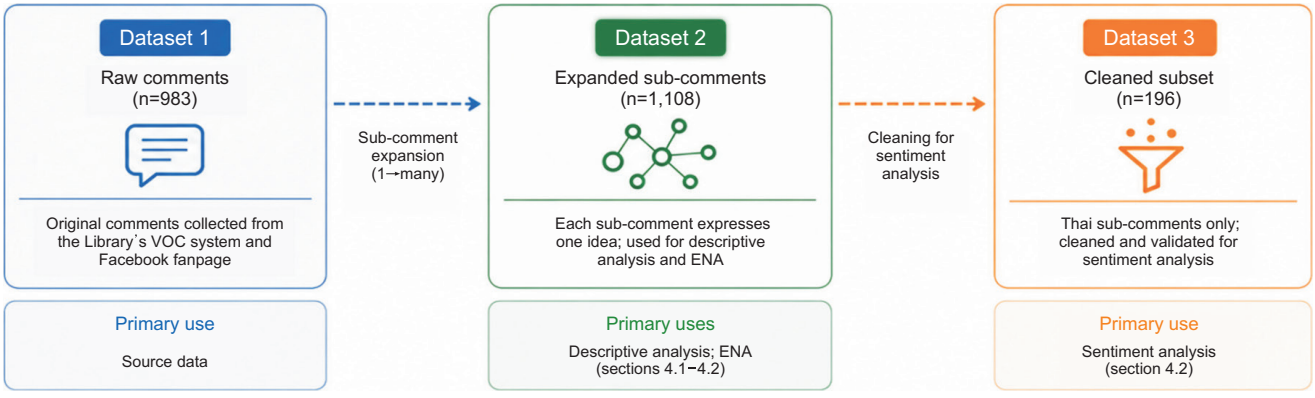


Fig. 4. Data processing pipeline (own data processing). VOC, voice of the customer; ENA, epistemic network analysis.

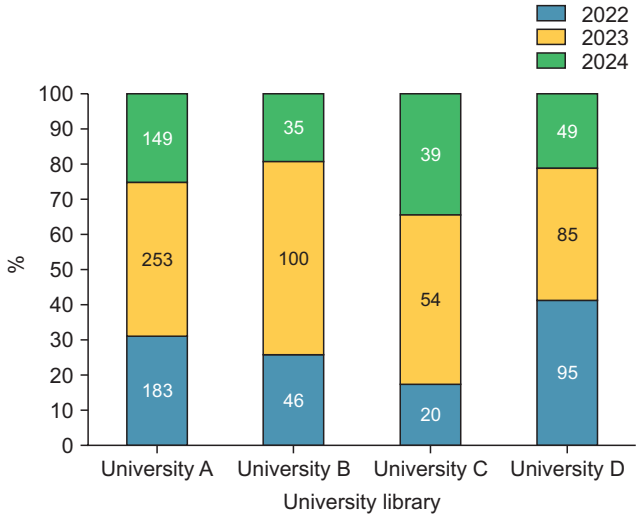


Fig. 5. Number of comments classified by year and university (own data processing).

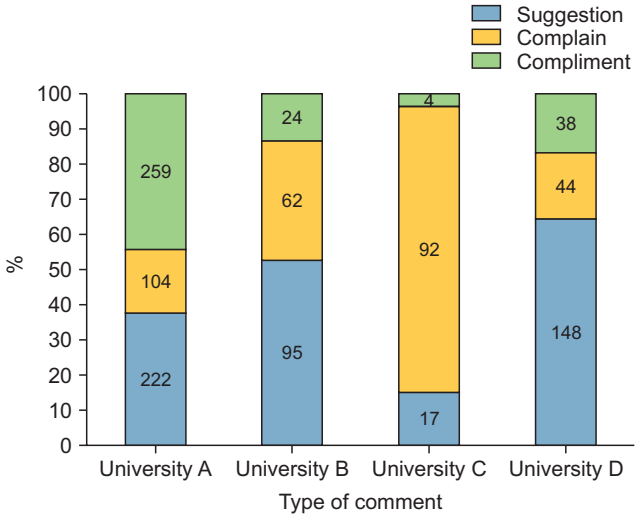


Fig. 6. Number of comment types classified by university libraries (own data processing).

comments (10.20%). When separated by year, University A had the highest number of comments in 2022, with 183 comments, followed by University D, Library B, and University C (95, 46, and 20 comments), respectively. University A had the highest number of comments in 2023, with 253 comments, followed by University B, University D, and University C (100, 85, and 54 comments), respectively. University A had the highest count of comments in 2024 with 149 comments, followed by University D, University C, and University B (49, 39, and 35 comments), respectively. Based on these comments, 'Suggestion comment' had the highest number of comments, containing 482 comments (43.46%), followed by 'Compliment comment' with 325 comments (29.33%) and 'Complain comment' with 302 comments (27.26%), respectively. University A has the highest count of the type of 'Suggestion comment' with 222 comments, followed by University D, University B, and University C (148, 95, and 17 comments), respectively. University A has the largest count of the type of 'Complain comment' with 104 comments, followed by University C, University B, and University D (92, 62, and 44 comments), respectively. University A has the highest count of the type of 'Compliment comment' with 259 comments, followed by University D, University B, and University C (38, 24, and 4 comments), respectively (Fig. 6).

When explored based on the theme of comments, 'Service' had the most comments with 314 comments (28.31%), followed by 'Buildings and Infrastructure' with 246 comments (22.18%), 'Facilities' with 233 comments (21.01%), 'Resources' with 167 comments (15.07%), 'Staff' with 97 comments (8.75%), 'User' with 39 comments (3.52%), and 'Activities and Events' with 13 comments (1.17%). University A has the largest count of the theme of 'Service' with 217 comments, followed by University D, University B, and University C (46, 32, and 19 comments), respectively. University A has the largest count of the theme of 'Buildings and Infrastructure' with 151 comments, followed by University D, University B, and University C (51, 33, and 11 comments), respectively (Fig. 7).

University A has the largest count of the theme of 'Facilities' with 112 comments, followed by University D, University C, and University B (53, 51, and 17 comments), respectively. University B has the largest count of the theme of 'Resources' with 58 comments, followed by University A, University D, and University C (54, 42, and 13 comments), respectively. University A has the largest count of the theme of 'Staff' with 36 comments, followed by University D, University B, and University C (30, 27, and 4 comments), respectively. University A has the largest count of the theme of 'User' with 14 comments, followed by University B, University C, and University D (11, 9, and 5 comments), respectively. University C has the largest count of the theme of 'Activities and Events' with 6 comments, followed by University D, University B, and University A (3, 3, and 1 comments).

5.2. Connection Between Comment Types and Theme

ENA was constructed using dataset 2 to explore how the type and theme of the comments interconnected. ENA

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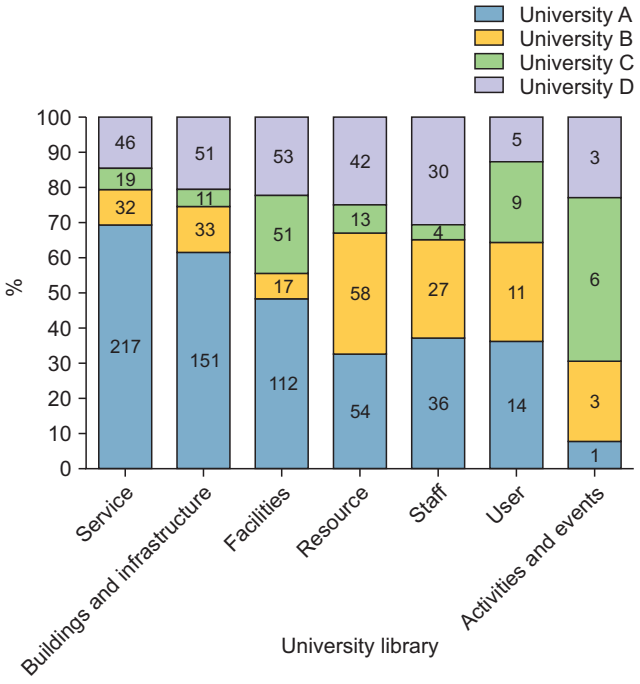


Fig. 7. Number of comments in each classified theme based on university libraries (own data processing).

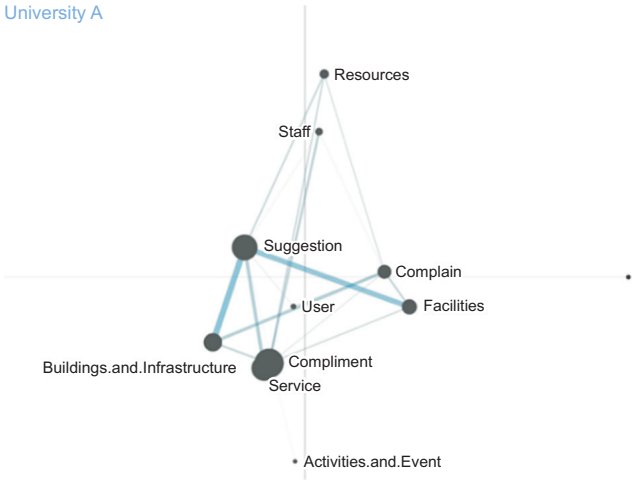


Fig. 8. The epistemic network analysis network of University A (own data processing).

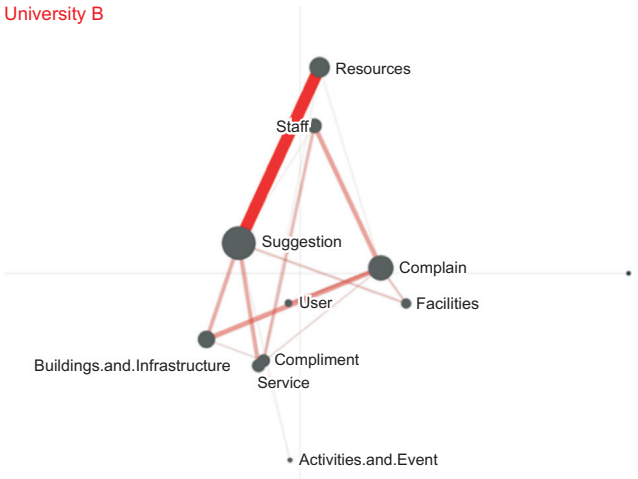


Fig. 9. The epistemic network analysis network of University B (own data processing).

models present the co-occurrence of coded discourse elements, in this case, the type and theme of the comments. The nodes in the network represent different discourse elements, including Suggestion, Complaint, Compliment, Facilities, Buildings and Infrastructure, Staff, Service, Resources, User, and Activities and Events. The edges connecting the nodes indicate relationships between these codes, with thicker edges signifying stronger associations in the dataset.

In The ENA network of University A, Fig. 8 reveals strong connections between 'Suggestion' and 'Facilities' and 'Suggestion' and 'Buildings and Infrastructure.' The examples of the comments include "I would like there to be more parking spaces," "I would like clearer signage indicating the locations of rooms," and "If the university could expand the service areas by adding more workshop-like spaces, it would be more beneficial for students in practice-based programs." This suggested that library users at University A frequently provided feedback on infrastructure and its facility-related improvements, often in a positive light, such as "I would like to have beds or sleeping mats available," "I would like the Internet to be more stable," "I would like more power strips and headphones provided," and "I would like the computers to operate faster and not be so slow." Additionally, there is a moderate connection between 'Suggestion' and 'Services,' indicating users' concerns about available services. The connections between 'Complaint' and 'Buildings and Infrastructure,' as well as 'Facilities,' were weaker than what was suggested. This showed that library users who visit University A had fewer complaints related to library facilities. They were likely to be satisfied with the library.

In contrast to University A's ENA network, University B library users were more likely to provide suggestions on the resources (Fig. 9). A distinctly strong connection between 'Suggestion' and 'Resources' was clearly projected. The thick linkage between these two nodes suggested that library users at University B tend to suggest and request additional resources for library usage. The most frequently observed comments were book requests as well

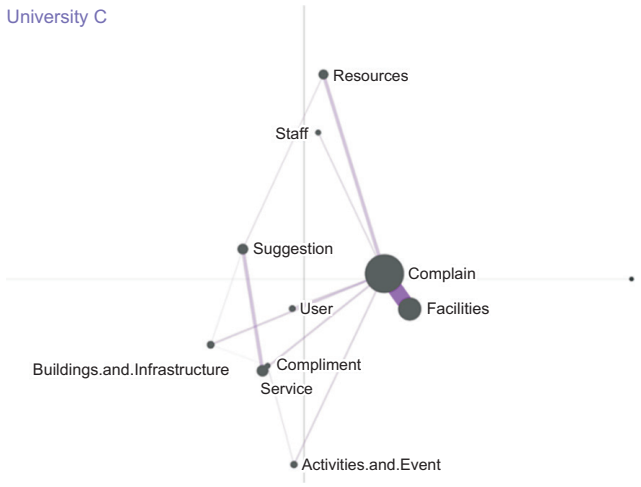


Fig. 10. The epistemic network analysis network of University C (own data processing).

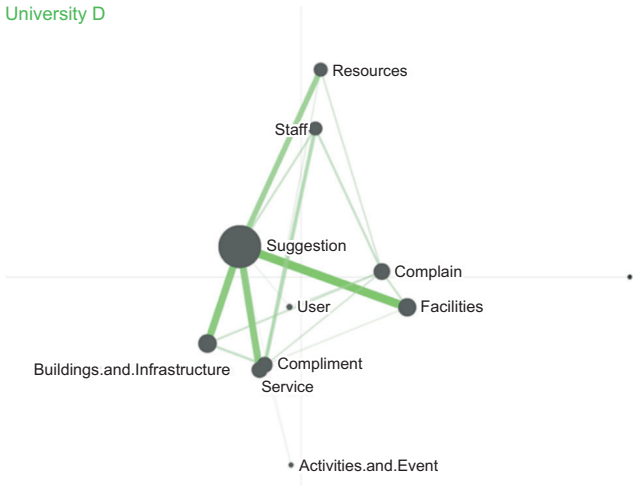


Fig. 11. The epistemic network analysis network of University D (own data processing).

as online library or journal subscription requests, such as "If the library could purchase the Web of Science database, it would greatly facilitate students' ease of retrieving information," "I would like the library to have comic books, manga, and other rare foreign language books, such as Khmer and Mon," and "I would like the library to have more complete coverage of certain databases, such as PubMed." The other observable connection was 'Complaint,' which linked to 'Buildings and Infrastructure' and 'Staff,' indicating that users acknowledge the need for improvements to the library's physical infrastructure and staff.

In University C library users' comments (Fig. 10) the ENA space showed the most significant connection between 'Complaint' and 'Facilities,' suggesting that users frequently expressed dissatisfaction with the state of library facilities: for example, "Many of the power outlets are not working," "There are not enough seats. Please consider extending 24-hour service on the first floor," "The member system has issues; logging in with SSO results in an error," and "Many of the chairs are damaged." Another notable connection was 'Complaint' and 'Resource.' This connection was based on users' discontent with the available resources. The relatively weak connection between 'Suggestion' and 'Service' implies fewer service-related recommendations from users compared to other universities.

In the ENA model for University D users' comments (Fig. 11), the largest observable node was 'Suggestion,' suggesting that this category had the highest frequency of occurrence or connectivity within the dataset. The boldest connections were observed between i) 'Suggestion' and 'Facilities'; ii) 'Suggestion' and 'Resources'; as well as iii) 'Suggestion' and 'Buildings and Infrastructure,' indicating a strong co-occurrence pattern. This implied that comments frequently linked suggestions with these three aspects ('Facilities,' 'Resources,' and 'Building and Infrastructures'), such as "I would like the Internet to be faster and not disconnect or lag frequently," "I would like more power outlets in various areas. Nowadays, having outlets available for charging different devices is quite important for users and helps increase user satisfaction with the library," and "Add lighting above shelves, bookcases, and reading tables, and install pull cords to turn the lights on and off to save energy." Additionally, connections between 'Staff' and 'Compliment' are also relatively strong. Much thinner lines were visibly rooted from 'Complaint.' This indicates that there were a much smaller number of complaints compared to the number of compliments or suggestions.

5.3. Emotion of the Comments Based on Sentiment Analysis

A total of 196 comments (refer to dataset 3) were included in the sentiment analysis process. The data has been cleaned and classified by using Naïve Bayes. The result of this classification is shown in Table 3. There were 128 positive comments (65.31%), 24 neutral comments (12.24%), and 44 negative comments (22.45%), respectively. Some examples of the positive text found in the dataset were 'very good service (บริการดีมาก),' 'good service staff (บุคลากรบริการดี),' and 'good suggestion (แนะนำดีมาก)'; some examples of neutral comments were 'want to have (อยากให้มี),' 'sufficient for

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Table 3. Sentiment analysis from library users (own data processing)

University library	Count of comments	Positive comments	Neutral comments	Negative comments
University A	104	67	12	25
University B	27	20	3	4
University C	19	13	3	3
University D	46	28	6	12
Total	196 (100%)	128 (65.31%)	24 (12.24%)	44 (22.45%)

needs (เพียงพอต่อความต้องการ)', and 'please consider (ฝากพิจารณา)'; and negative comments were 'not satisfied (ไม่พอใจ)', 'disturbing warning sound (เสียงเตือนรบกวน)', and 'negligent (เพิกเฉย)'.

Table 4 indicates that Bromberg and Lima (2013) achieve the best overall performance, with the highest F-measure (81.20%) and accuracy (80.00%). Hasko-Nagy (2017) attains the highest precision (88.10%) but has lower recall and accuracy, suggesting that more true cases are missed. Nielsen (2015) shows a comparable F-measure (80.20%) yet lower accuracy (71.30%). Overall, Bromberg and Lima (2013) provide the most balanced performance.

6. DISCUSSION

6.1. General Information about Comments from Library Users

From Objective 1, which aimed to analyze the voices of library users, the results showed that the facilities and their infrastructure issues remain a critical point from the user's perspective. This is reflected by University A and University D users who focused on providing feedback regarding the facilities and infrastructure of the library. According to the two universities, facilities and library infrastructure included equipment for usage, physical spaces, areas for activities and reading, and restrooms, as well as the quality of service provided by staff or librarians, i.e., guidance, care, and assistance. From the analysis results, it was shown that users believe the library's facilities are important and are points of interest; their decision to use the library services depends on this factor. It can be said that the length of period users spend in the library was influenced by comfort and convenience factors such as cleanliness, quietness, lighting, suitable chairs and tables, and an efficient Internet signal. This agrees with Shill and Tonner (2003), who reported that facilitating equipment and stuff in library infrastructure significantly affects user

Table 4. Comparing the performance of sentiment analysis (own data processing)

Library	F-measure	Accuracy	Recall	Precision
Bromberg and Lima (2013)	81.20%	80.00%	81.40%	82.20 %
Hasko-Nagy (2017)	79.40%	69.60%	72.30%	88.10%
Nielsen (2015)	80.20%	71.30%	78.40%	82.00%

numbers, particularly study rooms, quiet zones, comfort, environment, availability of power outlets, and Internet access. Despite the growing trend of online learning among student library users, enhanced physical surroundings continue to motivate most students to allocate more time to study at the library rather than at home or in their dormitories.

The results derived from University B had a distinctive pattern. University B is located in the capital city of Thailand, unlike other universities, which are considered regional universities. A high number of comments suggested and recommended additional procurement of book-type information resources. This might be because University B's policy is to promote by providing a diverse range of information resources. Hence, it opens the floor for users to recommend additional resources. However, this does not mean that facilities are unimportant. The result might be because University B already has high standards and access to modern technology, resulting in much fewer complaints regarding facilities and infrastructure. This suggested that the basic infrastructure and facilities of University B may already meet fundamental needs, such as comfort, a sense of safety, and responsiveness to usage. In other words, users do not feel the need to suggest or criticize in this area. It could mean that University B has designed its spaces, services, and library structures to such a high standard that there is no room for criticism in this aspect. Nevertheless, more profound study showed that University B already has a diverse information system and collection, while users continue to give feedback for additional information resources. It can be said that users have a higher demand for specialized resources. They may possibly want the library to provide more personalized services, notwithstanding the fact that there are already a variety of resources. This correlates with Shill and Tonner (2003), who pointed out that when a library's infrastructure and facilities have become standardized, users will otherwise suggest more resources and content quality. Furthermore, users' complaints about facilities can be reduced when university library spaces are well designed

and promote strong engagement (Khademizadeh & Venkatesha, 2014). Hence, University B should consider management of resources to improve services for special subgroups, e.g., by providing more interdisciplinary books, foreign language books, or resources that serve specific curricula. The library should, in addition, carry out in-depth surveys or focus groups to check users' satisfaction with noise levels, lighting, safety, or privacy, even in the absence of initial complaints.

In the case of University C, the analysis showed that most users complained about facilities, which is the major issue of the University C library. That reflects that the users' expectations have not yet been met in terms of physical aspects, and this may reduce the actual user experience (Dean, 2023), even though the library has good information resources (Hardin, 2025).

6.2. Connection Between Comment Types and Theme

From the overall analysis results, it was found that 'facilities' are the most frequently mentioned issue in several universities, such as University A and University D, which have suggestions for facility improvements. Meanwhile, University C is associated with complaints. This may be because 'facilities' are a significant focus for users and influence their decision to spend time in the library, whether it be regarding 'number of seats,' 'quiet areas,' 'adequate lighting,' 'signal network,' or appropriate temperature.' These are all environmental factors that users can immediately feel and experience while using the service, and they directly affect the duration of time users decide to spend in the library. In other words, if the library has complete facilities, users will spend more time there and are likely to return. In summary, facilities are a key indicator that users use to assess the quality of the library. An investigation by Oh et al. (2018) analyzes customer complaints and examines user reviews of the library. From the analysis, six primary categories of complaints were demonstrated: failure of collections to meet user needs, library services not being consistent with the service environment, librarians' proficiency and service-mindedness, inadequacies in the environment and facilities (e.g., location, cleanliness, or temperature), library services associated with service errors, and miscellaneous issues. The complaints reflected impacts on amenities' utilization, users' happiness, and users' favorable impression. Further, users' dissatisfaction may relate to the library's environment and amenities because they influenced a high degree of service utilization and user loyalty. This finding agrees with the research conducted by Khaznadar and Ali (2025), as user satisfaction increased if the library was well-structured, appropriately situated, and accessible. The architectural design of a library must correspond to human physical capabilities, for proper environments can enable the formation of a learning society that facilitates mutual knowledge exchange. When time passes, decent environments may form a center for creativity or intellectual progress, fostering innovators and enhancing academic performance in higher academic institutions (Yaylali-Yildiz et al., 2022). In this new learning age, apart from being an information resource, a library has transformed its roles into an academy of contemporary knowledge (Matthews, 2005). Provided that users' needs are fulfilled, any place, such as cafes, coworking spaces, or even their own homes/dormitories, can be chosen instead of a library. This finding addresses the second research objective by identifying the types of feedback that users provide and highlighting areas where service improvements may be required.

As far as the library service models are concerned, it can be gathered that each university focuses on different service models based on the management strategies and approaches of the university and library. This study indicated that each university library has a clearly different service model, which not only depends on the budget or the size of the university but also on the university-level strategies and the specific management methods of each library. The university's strategy influences the library's service objectives. For example, University B focuses on international-level research to emphasize deploying its library as a center with multiple information resources, database accessibility, specialized information resources, and online services. University D, which is a university with many campuses, focuses on comprehensive services, accenting shared digital information resources and flexibility in accordance with its local contexts. It was revealed that library management is significant. Though some libraries emphasize physical space enhancement, others may focus on digital services: self-check, Online Public Access Catalog, and virtuality. These varieties reflect the prioritization of each institution's goals and resources. Moreover, the background of library administrators influences the direction of information services, whether in physical or digital formats (Chiware, 2014).

6.3. Emotion of the Comments Based on Sentiment Analysis

When considering the library's services, it is found that the library continues to focus on providing assistance and supporting the learning of students, staff, and users

in various forms. The results of the sentiment analysis revealed that most comments (65.31%) were positive, as respondents showed appreciation towards the services, e.g., 'very good service,' 'good service staff,' 'good suggestion,' and 'sufficient for needs.' It can be said that users believed the library truly supports learning. The study results, moreover, reflected that users were satisfied with the quality of services, including personnel, recommendations, and the adequacy of resources in general. This correlates with Mao et al. (2024), who asserted that service models that focus on learning support and assistance from library officers have an impact on users' attitudes and feelings. In addition, positive attitudes towards library services revolve around personnel, the speed of assistance, and continuous learning support (Guo et al., 2024). Again, librarians' and officers' services, assistance, advice, and support indicate a good level of human relationships (human touch), which still remains significant in the digital age. The relationship between librarians and users in the digital era continues to be an important factor in creating service value and reflects a dimension of relationships that technology cannot fully replace in the context of libraries, especially in situations requiring specific information, advanced searches, or specialized academic assistance.

The role of modern librarians has deviated from being an information service officer to an information consultant. Users, in addition to seeking and acquiring information, can obtain high-quality advice. Thus, the highest level of service quality is not only the best infrastructure and facilities but also involves good advisory services, accessible assistance, and the service-mindedness of the staff (Mamta & Kumar, 2024).

Furthermore, sentiment analysis and ENA revealed a relationship between user satisfaction and accessibility to library services, aligning with Objective 3. In the case of University A, a large number of users expressed positive sentiments towards library services, particularly those supporting the university's internationalization, such as the provision of multilingual resources, English-language library training, and the design of reading spaces that consider users from diverse cultures. These services reflect University A's institutional context, which prioritizes internationalization policies and has a large proportion of international students, especially from China, Myanmar, and Vietnam. These factors may significantly contribute to positive user perceptions of library accessibility. This finding aligns with previous research indicating that libraries serving diverse user communities tend to adapt their services to accommodate linguistic and cultural differences (Houlihan et al., 2017).

In contrast, thematic structural analysis of University C reveals that users' perceptions of service quality are linked to library services that align with social contexts or situations, particularly the adjustments to services made during the COVID-19 pandemic. The themes identified by the ENA analysis indicate that mentions of library services are frequently associated with issues related to resource access, continuity of learning, and the institution's response during periods of discontinuous teaching. This pattern may reflect users' awareness of the library's crucial role in maintaining information access and supporting academic activities under crisis constraints. This finding aligns with previous research reporting that many academic libraries expanded their service models during the COVID-19 pandemic by implementing alternative service mechanisms, such as remote borrowing and resource delivery services, to support student continuity of learning (Green, 2022). In summary, these research findings indicate that users' attitudes towards library services depend not only on the availability of resources but also on the methods or models of service delivery that are appropriate for the user group. This plays a crucial role in creating positive perceptions and engagement between users and library services.

Furthermore, these findings contribute to the fourth research objective, which aims to compare patterns of user opinions and experiences across multiple university libraries. The comparative analysis of the four universities demonstrates distinct patterns of user feedback across institutions. For instance, University B and University D show a relatively high number of suggestions from users. Library users at University B primarily requested additional academic resources, such as books and journals, whereas users at University D provided a wider range of suggestions related to service improvements and infrastructure development. In contrast, comments from University A users mainly focused on facilities, buildings, and infrastructure, while several users at University C expressed dissatisfaction with certain library facilities. These differences reflect the unique service contexts and user expectations of each academic library, reinforcing the importance of considering institutional characteristics when interpreting user feedback and developing service improvement strategies.

7. PRACTICAL IMPLICATIONS

The findings of this study suggest important implications. This includes:

• *Service quality development*: Flexible, friendly responses, and attentive services were keywords often mentioned by users. The library should ensure that staff and librarians are trained to develop those service skills. However, different groups of users might require different kinds of services; therefore, rather than acting as traditional service providers, librarians might pay attention to the role of advisors, especially for students. The services and roles of librarians should be centered around 'human' or library users. One of the most successful examples is Thailand Knowledge Park, also known as Thailand Knowledge Park (2025), which transformed the traditional services from book storage to more dynamic, adaptive, and creative learning hubs. Thailand Knowledge Park restructured their services from book and information providers to facilitators, which received a considerable deal of attention from diverse groups of library users.

• *Enhance marketing strategies and user outreach*: The findings suggest that the education library might benefit from developing a marketing plan to communicate its services. This might be done by using digital media platforms that are frequently used by target users. This blended platform communication was successfully demonstrated by many libraries. For example, the National Library of Thailand adopted an omni-channel approach, which refers to the use of both online and offline channels to communicate available services and access. The use of omni enables anywhere, anytime access, which creates flexible access for library users. This similar approach is adopted by other universities in Thailand, including Maruey Library, Chiang Mai University Library, Thammasat University Library, and Thaksin University Library. They transformed their libraries into community hubs that serve all groups of people equally. Although different names were used to refer to these community hubs, such as co-working space, learning space, inspiration space, community space, edutainment space, library of life, etc., the underlying idea is to offer a creative and lively learning space to library users and the community.

• *Focusing on sustainable infrastructure*: The library should consider integrating resource and infrastructure management plans. This includes physical space organization and maintenance, and digital technology utilization by considering library users as the center for this management plan. Among the directions for infrastructure management plans are investments in green libraries and smart libraries. This direction might require the development of digital systems that align with the physical structure. Integrating the digital systems and physical space optimizes the use of library space for future sustainable development.

• *Context-specific in-depth study*: Future direction also should focus on conducting qualitative and quantitative research to examine how different groups of users interact, value, and have expectations regarding the library services. This is due to the cultural and environmental impact on the users' expectations of the library. A comparative study of library management would also shed some light on the best practices that inform the improvement of library management and services that would increase users' satisfaction.

• *Utilizing sentiment analysis*: The library might consider developing sentiment analysis and automating it for real-time use of this model. Sentiment analysis offers insight into analyzing user feedback, which informs the possible improvement of the digital library services.

8. LIMITATION OF THE STUDY

As highlighted earlier, this study offers several implications. However, some limitations need to be noted. These include:

• *Limitations of user opinion data*: The data used for analysis may come from online opinion sources or surveys that do not cover all time periods and user groups, especially public opinions, which are often from individuals with extreme experiences (positive or negative). Additionally, the interpretation of sentiment analysis may have limitations in understanding meanings in the Thai context, such as hidden meanings or sarcasm, which automated tools do not yet deeply comprehend.

• *Limitations of methodology*: While ENA is typically designed to leverage non-exclusive, overlapping codes that co-occur within the same unit of discourse, this study applied mutually exclusive coding. This means that each comment was broken down into smaller sub-units, and each sub-unit was assigned to only one type and one theme. The unit of analysis was, however, defined at the comment level. This decision was made to ensure coding consistency and reduce ambiguity during the annotation process. However, such an approach may constrain ENA's ability to capture the complex structure of the comments. As a result, the network connections observed in this study may reflect simplified relationships compared to those generated through overlapping coding schemes.

• *Limitations of dataset*: Even though this study applied a variety of analytical techniques, including descriptive

analysis, ENA, and sentiment analysis, each technique required different data pre-processing, which resulted in different numbers of comments included in each result (see Fig. 4). The descriptive and ENA results are based on the expanded sub-comment dataset (n=1,108), whereas the sentiment analysis results are drawn from a substantially smaller and independently cleaned subset (n=196) after removing redundant, incomplete, or non-textual entries. Because these analytical outputs rest on non-identical samples, institution-level patterns observed across sections are not directly comparable; for example, University C contributed 110 raw comments (Table 1) but only 19 comments qualified for sentiment classification (Table 3), limiting the robustness of institution-level sentiment comparisons. Furthermore, the cumulative attrition from 983 raw comments to 196 sentiment-eligible entries may introduce exclusion bias, as short, informal, or emoji-based expressions that may carry genuine sentiment value were removed during the sentiment-specific cleaning phase.

• *Differences*: This study collected data from four different universities in Thailand. These obviously have impacts from different external factors, such as budget, internal politics, or cultural, environmental, or physical space constraints that are not held as controlled factors in this study. These factors could be significant variables affecting the quality of library services. For instance, language and cultural differences might introduce bias in users' feedback. For instance, the dataset used in this study was compiled from the official platforms of four university libraries located in different parts of Thailand, i.e., the Central, Northern, Southern, and Northeastern regions. Each region has unique communication norms, dialects, and language expressions. This might impact the sentiment analysis results. For instance, communication norms are different; hence, it might reflect on how users express themselves in their comments and feedback. In some regions, users prefer indirect comments; hence, their tone is a politer critique. Meanwhile, in some parts, users might be more direct; hence, sarcastic tones might be used. This might result in over- or under-representation of negative comments in sentiment analysis. This tone and style of communication pose a challenge for machine learning algorithms, which lack consideration of cultural and other external factors. It is important to note that the sentiment analysis algorithm used in this study was not fine-tuned to any specific regional dialects or cultural expressions. The differences between observations from the four universities might be influenced by these external factors.

• *Delimitations*: Even though the data was collected from four different universities, the timeline of data collection was maintained in order to delimit the global impacts. Also, the discussion was made by considering the environment and other external impacts.

9. CONCLUSION

This paper presented an analysis of the messages left by library users from four main Thai libraries from 2022 to 2024. The descriptive analysis, ENA, and sentiment analysis were used to understand the users' comments. By integrating these analytical approaches to analyze the VOC, the study contributes to addressing the limited systematic analysis of large-scale library user feedback. This approach enables a deeper understanding of how users express their experiences, concerns, and expectations regarding library services. The results suggested that users paid much attention to the physical infrastructure, facilities, responsiveness, and attentiveness of librarians and staff, except for University B. The results from University B's pattern suggested that users tend to look for more resources and more special demand when the basic requirement was met. Besides this, human-centered service remains an important factor that impacts the users' experience in using the library. That is, the role of the librarian and staff in providing guidelines, support, and willingness to help remains crucial even in digital-based services. Additionally, offering integrated physical and digital services, maintaining user-focused development strategies, and continuing to adapt to the diverse, evolving, and context-specific needs of users are essential to remaining a central and valued part of the potential development of the library.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Universal Design in Academic Libraries in Ghana to Accommodate Students with Disabilities

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ABSTRACT

This study investigates how Ghanaian public university libraries conform to universal design principles to accommodate students with disabilities. The study employed a multiple case study design and was underpinned by the Social Model of Disability. A convergent mixed-parallel design was adopted, and online questionnaires were administered to 261 students with disabilities while in-depth interviews were conducted with 28 participants. The data were analysed thematically. Most university libraries were not universally designed to accommodate the needs of students with disabilities, which negatively affected information access, participation, and independence. Findings from students with disabilities revealed that the library design does not accommodate a wide range of individual preferences and abilities, nor does it provide an appropriate size and space for approach, reach, manipulation, and use. There is a need to strengthen policy and enforcement. Mandatory implementation of universal design and accessibility standards must be linked to accreditation or funding as enforcement incentives. The study emphasises the importance of allocating sufficient funds by university management and government for redesigning library facilities and services to facilitate the inclusion and equal participation of students with disabilities. Empirically, the study found lower adherence to universal design principles among Ghanaian academic libraries, revealing systemic barriers to access for differently abled students. The study is original, as it applies theoretical triangulation, integrating the principles of universal design and the Social Model of Disability to expose accessibility barriers in Ghanaian academic libraries, as well as institutional and attitudinal systems that perpetuate disablement.

Keywords: universal design, students with disabilities, social model of disability, academic libraries, inclusion, Ghana

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1. INTRODUCTION

The role of every library is to make available innovative and equitable information materials and services to satisfy the needs of all users, because "all persons have a right to information regardless of disability" (Abodunrin & Olutoyosi, 2020, p. 147). Decisions about inclusivity, accessibility, and usability are made at all levels of the library, from the external design to the internal layout and instructional planning. Accessibility is about how differently abled individuals can independently use facilities, services, communication and products. University libraries must aim to support access to facilities, information materials, and services for everyone (Blummer & Kenton, 2017), to maximize the benefits for users (Acheampong et al., 2020). Many scholars have pointed out the systemic issues and barriers within libraries that hinder people with disabilities (Foxhall et al., 2020; Oud, 2019).

Due to systemic challenges in including students with disabilities, universal design (UD) requires that all environments, communications, and products be accessible and accommodating to every individual, to the greatest extent possible from the outset, regardless of their abilities (NC State University, 1997). In other words, UD provides inclusive environments and learning opportunities that enable everyone to access and participate, regardless of their abilities.

In libraries, UD addresses users' accessibility needs at the development stage, integrating universal accessibility and creating functional products (Rose et al., 2002; 2006). Therefore, designing library facilities and services with accessibility requirements from the outset is more cost-effective than making future adaptations to the structure (Hitchcock et al., 2002). UD upholds the principles of equity, social justice, and diversity, promoting quality education regardless of individual differences, disabilities, or dispositions. It goes beyond legal accessibility requirements by seeking solutions that accommodate the varying needs, interests, and preferences of diverse users. Using UD principles and the social model as foundational elements, university libraries can provide access to resources for all users by creating an enabling, user-friendly, and barrier-free environment for persons with disabilities through adaptive solutions that enhance accessibility and benefit everyone (Banik & Banik, 2021, p. 69). Consequently, UD fosters a more normalised life, encourages a concerned library community, and supports high academic expectations for diverse users, especially those with disabilities.

1.1. Statement of the Research Problem

In 2020, the student enrolment numbers in tertiary education institutions in Ghana were slightly over 547,000, compared to just over 496,000 students in the previous year (Dierks, 2023). As student enrolment rises at Ghanaian public universities, there is likely to be a rise in the number of differently abled students in institutions of higher learning. Although advocacy for creating pathways for accessibility and success in institutions of higher learning for all individuals has existed for quite some time (Swanzy et al., 2019), studies across Africa, including Ghana, have shown limited attention to the education and provision of resources and facilities for persons with disabilities in higher education institutions (Akoto, 2021; Eneya et al., 2020; Kaunda & Chizwina, 2019; Obim & Akpokurerie, 2022). There are only a "handful of disability-friendly systems and facilities on campuses within the Ghanaian higher education sector" (Osei-Tutu, 2021, p. 23). Little conscious effort has been made to reframe university campuses, structures, and facilities to improve accessibility and accommodation for students with disabilities. Consequently, students with disabilities face difficulties in accessing resources, which hampers their full participation in studies (Tudzi et al., 2018) and their successful completion of university education. This situation also undermines the social justice of people with disabilities and contravenes the Inclusive Education Policy, which mandates higher education institutions to follow UD principles (Government of Ghana, 2015) and foster inclusive university environments that enable all students to participate and succeed in higher education (Mensah et al., 2024).

To eliminate the barriers that thwart the participation and inclusion of differently abled students in tertiary education, there is a need to adopt UD and promote social inclusiveness on university campuses (Ashigbi et al., 2017). If UD principles are applied in developing university libraries, they would be accessible to people with disabilities, foster learning opportunities, ensure equal participation, and help achieve the goal of providing library services that are accessible to all individuals, anywhere, regardless of time. This would support multiple means of engagement, multiple means of representation, and multiple means of action or expression in university libraries. However, the extent to which Ghanaian public university libraries are accessible to students with disabilities remains unknown (Braun & Naami, 2021). This study aims to examine how Ghanaian public academic libraries conform to UD principles to accommodate and

increase the participation of differently abled students in tertiary education. The findings may encourage tertiary institutions in Ghana to redesign their libraries to better accommodate differently abled students, thereby motivating more disabled persons to pursue and complete tertiary education in Ghana. The outcomes will also help evaluate the adoption of UD principles among university librarians and the perceived benefits within libraries.

1.2. Research Questions

This study aimed to examine how university libraries accommodate students with disabilities using UD principles at ten public universities in Ghana. The study is intended to answer the following research questions:

(a) What is the extent of UD principles' incorporation into the design and redesign of facilities, services, and resources to accommodate diverse users?

(b) What benefits are derived from the UD of libraries?

2. LITERATURE REVIEW

2.1. Universal Design

UD has gained increasing recognition in libraries over the past decade. Its roots lie in architecture, commercial products, and information technology (Burgstahler, 2014). The concept originated from architect Ronald Mace, who established the Centre for Universal Design at North Carolina State University (Weeber, 2026). Mace defined UD as "the design of products and environments to be accessible and usable to the greatest extent possible by people of all ages and abilities" (as cited in Burgstahler, 2014, p. 1). Spina (2021) described it as designing environments, buildings, services, interiors, and communication systems to be accessible and usable by everyone to the fullest extent. These definitions clearly show the broad scope of the concept, which applies to many fields and aspects of buildings, products, and interior design. The primary aim is to create designs that are accessible and usable to all individuals as much as possible. UD is also known as "Design for All," "Accessible Design," "Universal Access," "Inclusive Design," and "Barrier-Free Design" (Nygaard, 2018, p. 3). In developed countries like the USA, the Americans with Disabilities Act of 1990 prompted renovations for accessibility; similarly, Ghana enacted the Persons with Disabilities Act in 2006. These laws require the retrofitting of public buildings, including libraries, with features like ramps, elevators, wider doorways, and automatic doors (Gawronski, 2014). However, these retrofits sometimes posed problems, being viewed as unattractive and costly (Gawronski, 2014; Hayes & Bulat, 2017), and did not fully address the design issues and barriers to access and use. Conversely, to develop accessible environments and usable products for everyone, UD is considered a superior approach because it tackles user needs during the development process (Burgstahler, 2014).

UD aims to serve a wide range of users with a single, inclusive solution, eliminating the need for separate adaptations. For example, people pushing or pulling luggage often faced difficulties accessing certain public spaces, but the introduction of automatic doors, originally designed for wheelchair users to enhance accessibility, proved to be beneficial for everyone. As an approach, UD emphasizes inclusion and designing to accommodate the diverse demands of many users, regardless of their specific needs (Spina, 2021). This indicates that the concept of UD should not be limited to building access but should also extend to information resources and services in libraries. Such an approach could foster conditions that enable all individuals to participate and succeed. Therefore, UD creates environments that do not stigmatize individuals but instead allow everyone to navigate, manipulate, participate fully, and engage with society (Verma, 2021).

Moreover, the concept of UD benefits every individual and promotes improved accessibility and usability for all users (American Psychological Association, 2019). This implies that the design of new environments, communications, and buildings that are accessible aims to accommodate everyone. Berget (2020) examined the influence of UD on public libraries and found that UD served as the basis for equal health information access and possibly minimized the disparities within the health ecosystem for patrons with disabilities. Berget (2020) asserted that the implementation of the UD concept led to the development of resources that are available and accessible to everyone. This suggests that applying UD to libraries removes barriers that exclude patrons with disabilities from accessing a range of health information resources. It also shows how the concept helps libraries prevent health disparities that could cause unequal access to information.

Based on these benefits, libraries have adopted the philosophy of UD to offer equal access and opportunities to every student, regardless of ability. This demonstrates the point that UD minimizes the environmental demands on people with various levels of ability. It further suggests that the facilitation of human experience and performance can be supported by UD.

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2.2. Universal Design Principles

A university library is an integral part of the university system and plays a vital function in ensuring access to appropriate and needed information materials, both in print and electronic forms, for teaching, learning, and research. Libraries are expected to design their resources and environment in a way that is accessible and meets the information needs of potential patrons with a diverse range of characteristics, including students with disabilities.

This suggests that the library's goal of making its services and information materials accessible to differently abled students often benefits others. In the quest for libraries to make these resources accessible, equitable, inclusive, and usable by everyone, the principles of UD can be employed. This assertion is confirmed by Spina (2017a), who stated that in designing new spaces, the provision of appropriate signage and the reconstruction of various programs in a library, the principles can serve as an effective guide. Below are the principles of UD and guidelines for applications:

Principle 1: *Equitable use.* The design needs to be useful and marketable to individuals with varied abilities and offer similar use for diverse people. In other words, the library spaces and facilities should be appealing to diverse populations and avoid segregating or stigmatizing any users. Most importantly, it should provide privacy, security, and safety for all users. The library must be organized in a way that is useful to multiple users with diverse needs or abilities to access and participate. For instance, the library website should be designed to be accessible and usable by all people, especially individuals who are visually impaired and use screen reader devices (Burgstahler, 2014; Spina, 2021).

Principle 2: *Flexibility in use.* The library should accommodate a varied range of individual choices and user abilities. It should give options in the techniques of its use while facilitating accuracy and precision. It should also accommodate adaptability to the user's pace as well as provide access and use for both right- and left-handed individuals. This means that the library resources and services should accommodate user needs and abilities. For instance, a library should permit users to select to read or listen to the contents of a material, and provide alternative formats of a document, either in print or electronic form. As well, a computer table in the library should be easily adjusted to suit different user needs (Burgstahler, 2014; Spina, 2021).

Principle 3: *Simple and intuitive*. The library layout and information resources should be organized in an understandable and easy-to-use manner, irrespective of the individual's experience, skill set, or concentration level. The design should be able to work in the expected ways. It should not be unnecessarily complex and needs to be consistent with user expectations as well as provide vital information and effective feedback. Therefore, the physical library spaces and communications as well as systems should be properly laid out and easy to navigate irrespective of the user's experience. For instance, the control buttons on elevators in the library should indicate numbers and symbols that are simple and easy to understand (Attakora-Amaniampong et al., 2024; Burgstahler, 2014; Spina, 2021).

Principle 4: *Perceptible information*. The library design should communicate information effectively, irrespective of the space, conditions, or the user's sensory abilities. The library layout must offer multiple modes of output. The design should be legible as well as use different approaches (pictorial, verbal, tactile). It should be easy to give directions or instructions and be compatible with various techniques and devices. The library should provide a range of aids to assist in the communication of information. For instance, the library should have an emergency alarm system with visual, aural, and kinesthetic characteristics. Also, a video presentation projected during an information literacy programme for library users should include appropriate captions for the hearing impaired (Burgstahler, 2014; Spina, 2021).

Principle 5: *Tolerance for error*. The library design or layout must be able to reduce risks and any unintended actions. In other words, the library design and installation of equipment should make it difficult for users to make a mistake, but if users do, the error should not result in harm to the individual or product. Materials should be arranged logically with the most used and most accessible first. Any harmful elements should be eliminated while safety features and warnings are indicated. Librarians should be proactive in responding to the demands of patrons and ready to make available additional support. For instance, a library management software platform should provide controls when a student makes an unintended choice. Similarly, an "undo" feature in computer software tolerates mistakes without penalty (Burgstahler, 2014; Spina, 2021).

Principle 6: *Low physical effort*. The use of library resources and facilities should be achieved with minimal bodily effort. In other words, the design should minimize strain and overexertion. It should be efficient, comfortable, and minimize repetition and any forced use. Library users should not have to request support and assistance, but rather devices should be designated and available. For instance, library doors should open automatically for people without great physical effort. As well, software with on-screen control buttons should be large enough for users with limited fine motor skills to easily select (Burgstahler, 2014; Spina, 2021).

Principle 7: *Size and space for approach and use*. The design of the library should be done with consideration for the appropriate size and space for its use, irrespective of the mobility or body size of the user. In other words, the library layout and facilities should accommodate variations in individual body sizes and ranges of motion. Its facilities should facilitate appropriate sight levels for reaching and accommodating varied hand grips. There should be enough space for the use of assistive technology and extra assistance. The library should be well laid out for easy access and use without hindrance. For instance, the library should have reading spaces and adjustable tables that are usable by right-handed or left-handed users with varied physical disabilities (Burgstahler, 2014; Spina, 2021).

Ultimately, UD principles are useful and practical to apply to all sections of the library. Again, not only do these principles improve access, equity, inclusivity, and full participation for differently abled people but often help everyone (De Picker, 2020). Similarly, Spina (2017b) posits that these principles as a whole, with continual improvement in user feedback, can help to make environments, programs, communications, and services accessible to everyone. When this is achieved, it further promotes the utilization of information resources and library services to the greatest extent possible.

2.3. Theoretical Framework

The Social Model of Disability (SMD) was employed in this study as the theoretical framework to guide the research, interpretation of the data, and response to the research questions. SMD was introduced in the 1970s by activists for the physically impaired. It gained recognition through the work of Barnes (1991), Oliver (1990), and Finkelstein (1980), who shifted the focus from impairments to environmental barriers. Their ideas were later supported by Baffoe (2013) and Kumbier and Starkey (2016), who described disability as a socially constructed experience characterised by barriers that restrict persons with disabilities' access to opportunities, privileges, and resources in society. The individual disability is not the cause of exclusion and barriers experienced in academic libraries; rather, it is the absence of braille signage or inaccessible washrooms, among other issues, that obstruct and limit access to facilities and resources. The social model views disability as resulting from "environmental, institutional and attitudinal barriers" that infringe upon the rights and lives of persons with disabilities, thereby hindering their inclusion and progress across many areas, including education (French & Swain, 2013; Nectoux et al., 2023, p. 2). Swain et al. (2006) identified three types of social barriers: institutional or organisational barriers (norms, policies, practices, procedures), environmental barriers (physical obstacles), and attitudinal barriers (attitudes and behaviour towards people with disabilities). Therefore, it is the absence of inclusive library policies, inadequate screen readers and magnifiers, and stigmatisation and marginalisation that prevent the full participation, independence, and inclusion of differently abled students in academic libraries.

SMD has been used extensively in disability studies in the academic sphere but has evoked conceptual debates. Shakespeare and Watson (2001) praised the effectiveness and simplicity of SMD but warned against blaming society for impairments. In contrast, People with Disability Australia (2018) opined that the model is not in denial of the reality of impairment and its effect on the individual, but challenges the inflexible institutional policies and procedures, prejudices, stereotyping, inaccessible websites, and the social environment of university libraries and their staff failure to accommodate disability as an expected circumstance of one's diversity. Beaudry (2016) focused on exclusion, indicating that it is caused by the social failure of inclusivity and ethical orientation. The SMD seeks to create inclusive environments for persons with disabilities.

Thornton and Downs (2010) applied SMD in their study "Walking the walk: Modeling social model and UD in the disabilities office" and recommended revising policies and procedures for change. Kumbier and Starkey (2016) studied disability justice and libraries, and based on SMD, advocated for an understanding of access that responds to pragmatic needs and guides professional practices and ethics. Eneya and Mostert (2019) examined the applicability of SMD within Wilson's information be-

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haviour model for effective and efficient service provision to students with disabilities in academic libraries. This therefore calls for the redesign of library policies and procedures along with the library environment, and the dismantling of prejudice and stereotyping against individuals with disabilities. Contrasting with previous studies, SMD advances the understanding that environmental, institutional, and attitudinal barriers are evidence of systemic failures, revealing that disability is the product of the design of libraries and policy failures, not individual impairments.

3. RESEARCH METHODS

This study employed a multiple case design and a mixed methods research methodology. The study embraced a pragmatism which opens the door to mixed methods research, applying multiple methods, different assumptions, and various forms of data collection and analysis (Creswell & Creswell, 2018). For this study, a convergent parallel design was employed, and both qualitative and quantitative data were collected simultaneously at the research sites during the study process. Equal weights were given to the approaches, all sets of data were independently analyzed, and the findings were interpreted together (Creswell & Plano Clark, 2018; Demir & Pismek, 2018).

3.1. Research Instruments

The study used questionnaires, in-depth interviews, and observations to examine the use of UD in academic libraries to accommodate students with disabilities in ten Ghanaian Universities. The questionnaires contained fixed responses as well as open-ended questions. The questionnaires and interview guide were constructed using five (5) major sections based on the objectives of the study. Both tools focused on demographic and background information about the respondents; physical access into and within Ghanaian public university library buildings; information about the facilities, services, and assistive technology offered to differently abled students and the attitude of library staff towards differently abled students; library experiences of participants regarding accessibility, usability, and inclusivity of library resources and services; and redesigning of library spaces and resources to accommodate differently abled students and how university libraries conform to the principles of UD. Furthermore, the seven (7) principles of UD (Bostick & Eigenbrodt, 2017) and the International Federation of Library Associations and Institutions (IFLA) checklist for access to libraries for people with disabilities (Irvall & Nielsen, 2005) were employed as observation rubrics to evaluate existing levels of accessibility to the buildings, services, resources, and programs of the libraries.

3.2. Sampling and Data Collection

For the qualitative data collection, purposive sampling was used. The researchers conducted face-to-face in-depth interviews with 28 participants in their offices and rooms that they considered suitable out of a targeted 30 respondents, which comprised university librarians, heads of the disability unit, and heads of the physical development office from ten (10) Ghanaian public universities. These participants were selected because they head departments, initiate policies, and more importantly they are information-rich (Patton, 2015) and can help in answering the research questions. The overall response rate for the interviews was 93%.

Similarly, the total population purposive sampling technique was also applied in this study because of its ability to select the entire population that has a particular set of features (White, 2019). All of the students with disabilities (hearing, visual, and mobile impairments) were selected from the ten public universities for this study regardless of their year of enrolment, and a mixed-mode approach (Braille version and web-based questionnaires) was administered to all of them through their emails/WhatsApp platform (WhatsApp LLC., Menlo Park, CA, USA). The visually impaired participants were asked to write the number of the question and their answer in full text. The researchers created a follow-up with respondents at various university campuses, and convenience sampling was employed to recruit the students before or after lectures. The questionnaires were self-administered to those who had not responded to either the Braille or web-based questionnaires, especially those with visual disabilities. The completed questionnaires (110) were uploaded to the web-based questionnaire. A total of 261 completed questionnaires were received out of a sample size of 485 and reflect an overall satisfactory response rate of 53.8%.

To address the research questions, both structured and unobtrusive observations were applied. The structured observation involved an observation schedule with a fixed number of points to observe in a pre-determined number of cases. For unobtrusive observation, different aspects of the library building, facilities, and resources were observed, allowing the gathering of data devoid of interference with the subjects under study (Kiruki & Mutula,

2023) and curtailing biases from the researcher (Trochim et al., 2016).

This multiple sampling was employed as a robust approach to enable the researchers to capture the breadth of the phenomenon as well as the depth of lived experience. This multiple strategy leads to richer insights, increases the validity and reliability of the findings, and fosters confidence in the conclusions drawn. The approach allows for richer data and complete results that yield more relevant and applicable findings (Ahmed, 2024).

The researchers further employed triangulation and pilot testing, and sought to guard against biases from researchers to increase the internal and external validity of the research instruments and data.

3.3. Data Analysis

The quantitative data from the web-based questionnaires and data from the library observation were analysed using IBM SPSS Statistics (version 27; IBM Corp., Armonk, NY, USA) to produce descriptive statistics. The qualitative data were transcribed, coded, and thematically analysed using Atlas.Ti (ATLAS.ti GmbH, Berlin, Germany). The qualitative and quantitative findings were merged and interpreted together to answer the research questions.

3.4. Setting

The study was conducted among students with disabilities, development officers, disability officers, and librarians at ten Ghanaian public universities. The study researchers used ten (10) Ghanaian public universities out of a total of twenty-four (24) selected based on their practice of inclusive education, and which have a significant number of students with disabilities (Addai-Wireko et al., 2020), have disability offices, have library facilities, and model best practices for affiliate institutions (Alu & King, 2024). The ten public universities are scattered throughout the country, and this will help to reveal the practice of UD principles among higher institutions to accommodate differently abled students in their libraries.

4. RESULTS AND DISCUSSION

This section provides details of the analysis of the qualitative and quantitative data. Both datasets were organized, analyzed separately, merged, and interpreted against the background of the study's purpose of examining how Ghanaian academic libraries conform to UD to accommodate differently abled students. It was supported by SMD.

4.1. Quantitative Data Analysis

4.1.1. Profile of Questionnaire Respondents

The age, sex, and program enrolled in were background information gathered from students with disabilities. Responses were received from 162 visually impaired, 69 mobile impaired, and 30 hearing impaired students.

Table 1 below indicates that the majority (252, 96.6%) of the students with disabilities in this study pursued bachelor's degree courses while five (1.9%) were enrolled in master's degree programs. Four (1.5%) students were registered for PhD programs. This finding implies that fewer persons with disabilities pursue higher degrees as compared to their abled counterparts. This trend may be an outcome of the inadequate funding available for students with disabilities to undertake higher degree programs. It could also be attributed to the inadequate facilities, resources, services, and assistive technology that are offered to support their education.

The majority (179, 68.6%) of the students with disabilities across the ten public universities were male while 82 (31.4%) were female. The low female enrolment may be attributed to cultural beliefs and discrimination against women and female school education. Evidence showed that "girls and women with disabilities are most affected by stigma and discrimination, experiencing it both as a result of their disability and their gender" (Ando, 2017, p. 2).

One hundred and twelve (42.9%) students were between the ages of 20 and 24 years followed by those aged

Table 1. Demographic information of questionnaire respondents

Disability	Respondent	Program			Sex		Age (yr)			
		Bachelors	Masters	PhD	Male	Female	15-19	20-24	25-29	30+
Visually Impaired	162	158	4	-	107	55	8	55	70	29
Mobile Impaired	69	65	1	3	49	20	5	48	10	6
Hearing Impaired	30	29	-	1	23	7	2	9	16	3
Total	261	252	5	4	179	82	15	112	96	38

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between 25 and 29 years (36.7%). This indicates that most of the students with disabilities who enrolled in tertiary education to pursue various degree programs were between the ages of 20 and 29 years.

4.1.2. Students with Visual Impairments

To determine the application of UD principles in university libraries, a five-point Likert scale of 1=strongly agree (SA), 2=agree (A), 3=neutral (N), 4=disagree (D), and 5=strongly disagree (SD) was employed, requiring the respondents to indicate their level of agreement on the principles of UD in libraries.

Most of the respondents disagreed and strongly disagreed with the statements that the library communicates necessary information effectively to users (96, 59.3%), services and resources are useful and marketable to people with a wide range of abilities 82 (50.6%), design and facilities can be used with low physical effort (78, 48.1%), design, website, and instruction guide for students are easy to understand (63, 38.9%), design and facilities do not minimise hazards and accidents (63, 38.9%), as well as design and services accommodate a wide range of individuals preferences and abilities (57, 35.2%). In contrast, (51, 31.5%) strongly agreed and agreed that the library provides an appropriate size and space for approach. It should be noted that relatively many students stayed neutral. Table 2 reflects the responses.

4.1.3. Students with Mobility Impairments

Mobile impaired respondents indicated their agreement with statements regarding UD in libraries. The respondents were given a Likert scale: 1= SD, 2= D, 3= N, 4= A, 5= SA to choose from. The data indicate that most of the respondents disagreed with all the statements. Fig. 1 reflects that students disagreed with assertions that library services and resources are useful and marketable to people with a wide range of abilities (33.3%), the library design and services accommodate a varied range of individual choices and abilities (31.8%), the library design, website, and instructional guide for students are easy to under-

Table 2. Application of universal design principles in the university libraries (n=162)

Principles		SA	A	N	D	SD	Total
Equitable use	• Library services and resources are useful and marketable to people with a wide range of abilities	10 (6.2)	41 (25.3)	29 (17.9)	59 (36.4)	23 (14.2)	162 (100)
Flexibility in use	• The library design and services accommodate a varied range of individual choices and abilities	6 (3.7)	40 (24.7)	59 (36.4)	37 (22.8)	20 (12.4)	162 (100)
Simple and intuitive use	• The library design, website, and instruction guide for students are easy to understand, regardless of the student's experience, knowledge, language skills, or current concentration level	11 (6.8)	29 (17.9)	59 (36.4)	36 (22.2)	27 (16.7)	162 (100)
Perceptible information	• The library communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities	9 (5.6)	37 (22.8)	20 (12.3)	36 (22.2)	60 (37.1)	162 (100)
Tolerance for error	• The library design and facilities minimise hazards and the adverse consequences of accidental or unintended actions	11 (6.9)	40 (24.7)	48 (29.6)	34 (20.9)	29 (17.9)	162 (100)
Low physical effort	• The library design and facilities can be used effectively and comfortably and with low physical effort	5 (3.1)	44 (27.2)	35 (21.6)	37 (22.8)	41 (25.3)	162 (100)
Size and space for approach and use	• The library provides appropriate size and space for approach, reach, manipulation, and use of facilities and services regardless of the user's body size, posture, or mobility	11 (6.8)	44 (27.2)	59 (36.4)	28 (17.3)	20 (12.3)	162 (100)

Values are presented as number (%).

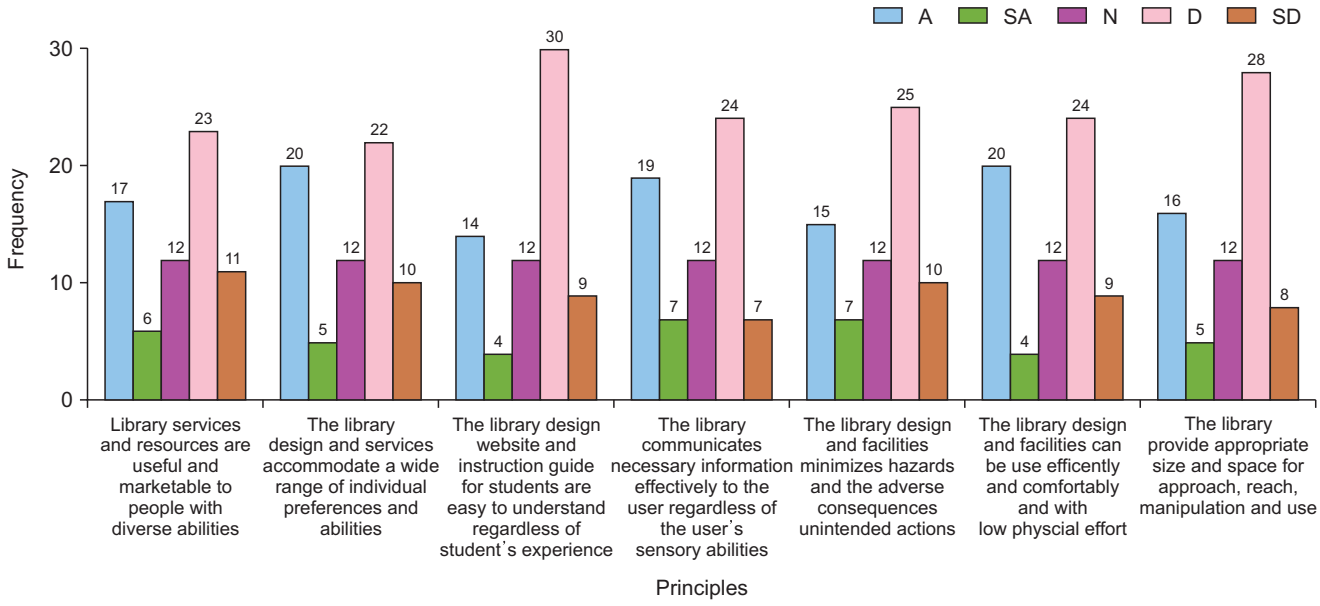


Fig. 1. Universal design principles in academic libraries (n=69). A, agree; SA, strongly agree; N, neutral; D, disagree; SD, strongly disagree.

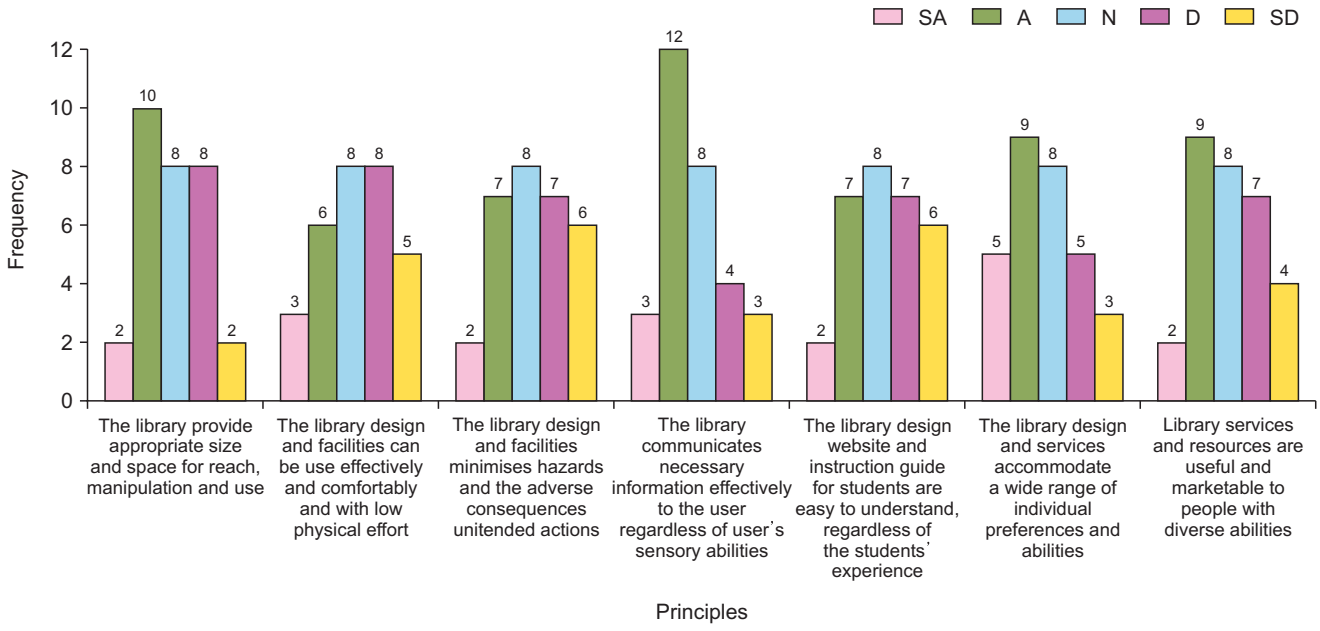


Fig. 2. Universal design principles in university libraries (n=30). A, agree; SA, strongly agree; N, neutral; D, disagree; SD, strongly disagree.

stand, regardless of the student's experience (43.4%), the library communicates necessary information effectively to the user, regardless of the user's sensory abilities (34.7%), the library design and facilities minimize hazards and the adverse consequences of unintended actions (36.2%), the library design and facilities can be used efficiently and comfortably and with low physical effort (34.7%), and the library provides appropriate size and space for approach, reach, manipulation and use (40.5%).

4.1.4. Students with Hearing Impairments

The hearing-impaired were also asked to indicate their agreement with the application of UD in university libraries. As shown in Fig. 2, most of the respondents agreed that the library communicates necessary information effectively to the user, regardless of the user's sensory

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abilities (40%), provides appropriate size and space for approach, reach, manipulation, and use (33.3%), the library design and services accommodate a wide range of individual preferences and abilities (30%), and the library services and resources are useful and marketable to people with a wide range of abilities (30%). However, eight (26.6%) of the respondents indicated neutrality toward claims that the library design and facilities can be used effectively and comfortably and with low effort, the library design and facilities minimize hazards and the adverse consequences of unintended actions, and the library website design and instructional guide for students are easy to understand, regardless of the student's experience.

4.2. Observation of Library Designs, Resources, and Facilities

The researchers further conducted an observation of the design of university libraries, resources, and facilities at the ten (10) public universities. The researchers used the Access to Libraries for Persons with Disabilities checklist by IFLA and UD principles for the observation. The results of the checklist observations are shown in Table 3 below.

The Persons with Disability Act (Act 715) of 2006, Section 26, enjoins that "parking spaces shall demarcate a special parking slot reserved for the exclusive use of persons with disabilities." However, the observation results uncovered that in all ten university libraries surveyed, none of the parking areas were marked with the international symbol of access for disabled people. This is illustrated in Fig. 3.

The researchers also observed that none of the ten (10) university libraries had an emergency exit plan posted that catered for the needs of people with disabilities. Although most of the university libraries had signage, none of them had warning signals that were clear to people with disabilities and reachable from a wheelchair. None of the university libraries had restrooms available for students with disabilities. The observation further noted that three (3) of the university libraries had a special room (Braille library) designated for people with visual disabilities. One of them is illustrated in Fig. 4.

None of the university libraries had computer workstations that were adapted for individuals in wheelchairs (Fig. 5).

The researcher observed that eight of the university libraries had no designated toilet facilities with a washbasin, mirror at an appropriate height, handles, and a flushing lever that was disability friendly, as can be seen in Fig. 6.

Table 3. Observation of library layout, resources, and facilities (n=10)

Aspects observed	Yes	Frequency	Percent (%)
• Is there an appropriate symbol of access marked at parking spaces?	Yes	0	0
	No	10	100
• Are there signs, signage, and pictograms in Braille form that are clear to people with disabilities, especially the visually impaired?	Yes	0	0
	No	10	100
• Are there restrooms available for students with disabilities?	Yes	0	0
	No	10	100
• Is there a special room/space designated for people with disabilities?	Yes	3	30
	No	7	70
• Are there designated computer workstations such as the OPAC adapted for individuals in wheelchairs?	Yes	0	0
	No	10	100
• Is there a designated toilet facility with a washbasin, a mirror at an appropriate height, handles, and a flushing lever reachable for wheelchair users and persons with disabilities?	Yes	2	20
	No	8	80
• Are there special media for persons with disabilities, e.g., talking books, Braille books, and/or large print books?	Yes	3	30
	No	7	70
• Are there ICT and assistive devices like tape recorders, CD players, DAISY, magnifying glasses, CCTV, screen readers, disability software and apps, and adaptive keyboards?	Yes	3	30
	No	7	70

OPAC, Online Public Access Catalogue; ICT, Information and Communication Technology; DAISY, Digital Accessible Information System.



Fig. 3. International symbol of access for disabled people.



Fig. 4. A Braille library in one of the universities.

Only two libraries had disability-friendly washrooms. Fig. 7 is an example of a disability-friendly washroom.

The researchers observed that three (3) university libraries had special media such as talking books, Braille books, and large print books for students with visual impairments, and in addition, three of the university libraries had assistive devices such as tape recorders, CD players, Digital Accessible Information System (DAISY), magnifying glasses, CCTV, screen readers, disability software and applications, and adaptive keyboards to assist visually impaired students.

4.3. Qualitative Data Analysis

4.3.1. Profile of Interview Respondents

The study discovered that of the 28 respondents interviewed, eighteen (64.3%) were male and ten (35.7%) were female. Two (LIB1, LIB5) out of the ten females had PhD qualifications compared to five males holding PhD

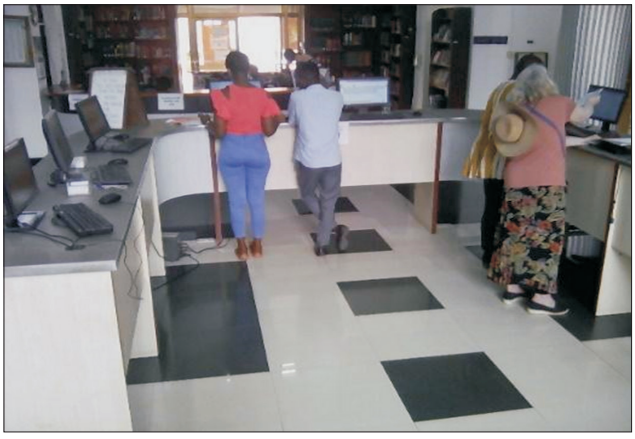


Fig. 5. Computer workstations not reachable by a wheelchair user in one of the university libraries.



Fig. 6. A washroom not disability friendly in one of the university libraries.

degrees (LIB3, LIB8, DU5, DU6, DU8). There is evidence of sex disparity among the interview respondents as more males were employed or appointed as heads of departments in public universities. It appears that there is less emphasis on sex equity as well as social justice and gender fairness regarding employment in higher education institutions in Ghana. A summary is shown in Table 4.

4.4. Interviews

The data were gathered via face-to-face in-depth interviews with University Librarians, Heads of the Physical Development Office, and Heads of the Disability Units from ten (10) Ghanaian public universities. Some similar questions were asked to all three (3) interviewee groups

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and varied questions aligned to the expertise of the interviewee groups were asked. Responses were transcribed, analyzed, and categorized into themes.

The ten (10) University Libraries were labeled UL1, UL2, UL3,···, UL10.

The ten (10) University Librarians were labeled LIB1, LIB2, LIB3,···, LIB10.

The ten (10) Heads of Disability Units were labeled DU1, DU2, DU3,···, DU10.



Fig. 7. A disability-friendly washroom in one of the university libraries.

The ten (10) Heads of the Physical Development Office were labeled PD1, PD2,···, PD10.

4.4.1. Application of Universal Design Principles in University Libraries

The concept of UD deals with the design of buildings, facilities, communications, services, and products in a way that is accessible to everyone regardless of their abilities. The concept has seven principles with guidelines for the design process. The respondents were asked if they were familiar with the concept of UD and how they incorporated the seven principles in the new design and redesign of library buildings and services to accommodate students with disabilities. Responses are shown in Table 5 below.

Table 5 reflects that LIB1, LIB3, LIB7, LIB9, and LIB10 indicated a lack of awareness of UD in university libraries. LIB3, LIB8, LIB10, DU1, and PD9 reported that there is a lack of incorporation of UD principles in the designing and redesigning of facilities and services to accommodate differently abled students. DU1 believes that UD in libraries would be expensive to implement.

4.4.2. Benefits of Universal Design Principles in Academic Libraries

UD principles have contributed greatly to the benefit of everyone, especially differently abled students in institutions of higher learning and their libraries. The responses to the questions on the benefits of UD are presented in Table 6.

Table 6 reflects that DU1, DU3, PD2, and LIB3 re-

Table 4. Universities, positions, and sex

University library	Respondents			Total respondents	Male	Female
	LIB	DU	PD			
UL1	1	1	0	2	0	2
UL2	1	1	1	3	1	2
UL3	1	1	0	2	2	0
UL4	1	1	1	3	3	0
UL5	1	1	1	3	2	1
UL6	1	1	1	3	1	2
UL7	1	1	1	3	3	0
UL8	1	1	1	3	3	0
UL9	1	1	1	3	1	2
UL10	1	1	1	3	2	1
Total	10	10	8	28	18	10

UL, University Libraries; LIB, University Librarians; DU, Disability Units; PD, Physical Development Office.

Table 5. Application of universal design principles in university libraries

Theme	Responses (n=28)
• Lack of awareness of universal design	Some libraries and mine are not aware of the universal design principles and their potential to promote inclusion (LIB1, March 2022) Well, the framework/concept you mention is new to me. I am not familiar with the principles, but these principles could have been embedded in the Disability Act (LIB3, May 2022) There is inadequate knowledge and awareness about disability issues and universal design among some librarians (LIB7, February 2022) I am not familiar with the concept of universal design (LIB9, May 2022) Universal design has not been implemented in our library to accommodate differently abled students due to inadequate knowledge of the principles (LIB10, May 2022)
• Lack of incorporation of universal design principles	Universal design principles were not fully incorporated into the design of the library because access for students with disabilities is restricted (LIB8, July 2022) We have not incorporated these principles into any of the structures we have currently, including the library building (LIB10, May 2022) Sometimes the nature of some library buildings makes them difficult to alter or break down (LIB3, May 2022) These principles of universal design were not applied in the design of the library, so the arrangement is not easy to navigate for students in wheelchairs (DU1, February 2022) Sometimes, we apply some of the principles in the construction of ramps, washrooms, and other facilities (PD2, PD7, PD8, PD9, 2022).
• Expense of implementing universal design	It is also expensive to implement universal design in libraries due to budget constraints (DU1, February 2022)

LIB, University Librarians; DU, Disability Units; PD, Physical Development Office.

Table 6. Benefits of universal design in libraries

Theme	Responses (n=28)
• Eliminates discrimination	It eliminates discrimination and marginalisation to allow everyone to benefit (DU1, February 2022). It does not discriminate but provides easy accessibility (DU3, May 2022). It eliminates discrimination in buildings and provides access for all (PD2, May 2022). The concept promotes fairness and there is no discrimination (LIB3, May 2022)
• Promotes equity and inclusion	It allows equal treatment of students irrespective of their abilities and also promotes equity and inclusion of students with disabilities (LIB2, May 2022). It promotes equity and people have equal access to information and facilities (LIB3, May 2022).It promotes equity and allows everyone to access resources, facilities, and services, and it supports the inclusion of persons with different abilities (DU2, May 2022). It promotes all-inclusive buildings that accommodate everyone (PD2, PD7, PD8, PD9, 2022)
• Promotes independence of differently abled students	The universal design principles promote barrier-free environments (PD2, May 2022) The major benefit is that it accommodates everyone as well as provides easy access for everybody (DU1, DU3, DU7, May 2022)

LIB, University Librarians; DU, Disability Units; PD, Physical Development Office.

ported that UD eliminates discrimination which allows everyone to benefit, while LIB2, LIB3, DU2, PD2, PD7, PD8, and PD9 indicated that UD promotes equity and inclusion of people with disabilities in universal libraries. DU2, DU3, and DU7 are of the view that UD promotes the independence of students with disabilities.

5. DISCUSSION

5.1. Universal Design in University Libraries

UD principles have attracted interest from educators, including the library community. There is extensive discussion among library professionals, architects, and inclusive educators about how to incorporate UD principles into the design of systems or the redesign of existing ones to accommodate persons with disabilities, thereby improving access, equity, participation, and the quality of services in information organisations (Lund et al., 2020). In recent years, the application of UD principles has increased significantly in higher education, including libraries across the world, particularly in the Global North. However, the review of existing literature reveals a lack

of UD applications in Ghanaian public university libraries. Therefore, this study examined UD in ten academic libraries in Ghana to better support students with disabilities and highlighted the benefits of UD in libraries. UD is a strategy associated with various sectors such as health, education, and architecture (Burgstahler, 2014), but its role in providing accessible and usable resources, services, and facilities can foster inclusive practices in higher education, especially within academic libraries (Moriña, 2017).

Accessibility for students with disabilities in academic libraries is crucial, given the diverse nature of higher education institutions. Based on the studies of Tudzi et al. (2018; 2020) and Ayoung et al. (2021) on non-compliance, the present findings revealed a more holistic assessment. There is a complete absence of UD within Ghanaian academic libraries as an operational framework. The results indicate that the majority of differently-abled students (visually impaired 59.3%, mobile impaired 65.1%) unequivocally disagreed that the library design accommodates a varied range of individual choices and abilities, or that facilities minimize hazards, enable efficient and comfortable usage, and provide access with low physical effort, as well as providing an appropriate size and space for approach, reach, manipulation, and use. This subjective experience is confirmed by the absence of parking areas with the disabled international symbol of access, of warning signals clear to people with disabilities and reachable from a wheelchair, of restrooms available for students with disabilities, and of computer workstations adapted for individuals in a wheelchair. The findings further reveal that only three university libraries had a dedicated room (Braille library), media, and assistive devices available for people with disabilities as positive accommodations. However, these resources are ineffective if differently-abled students find it difficult to navigate unmarked pathways, high-threshold doorways, and incomprehensible signage to access these rooms.

These findings above clearly exemplify the failure of these academic libraries to implement UD Principle 1: Equitable use. This means that most differently abled students were not able to access most of the facilities and resources of the libraries like their abled counterparts. Similarly, the principles of flexibility and low physical effort were breached due to the absence of adjustable computer workstations and shelves that are unreachable from a wheelchair. The findings are linked to SMD, which emphasizes the removal of environmental barriers that cause exclusion and barriers experienced in academic libraries, obstructing and limiting access to facilities and resources. These findings support the study of Ochieng et al. (2021), which found that UD principles are minimally applied in buildings and facilities. Ochieng et al. (2021) recommended major retrofitting of public facilities that are not accessible to persons with different abilities. Similar views were expressed by Dempsey et al. (2023), who stated that anatomy educators were unaware of UD, resulting in minimal incorporation. The impact, as noted in the studies by Roberson et al. (2022) and Foxhall et al. (2020), is that students with disabilities rely on classmates and friends for research assistance rather than the librarian because the hostile environment hinders their independent use.

The study by Nazim et al. (2021) contrasts with the current finding, as it demonstrates sufficient, accessible provision at the Helen Keller Library in India, indicating that the Ghanaian situation reflects an institutional and conceptual gap. Therefore, the current study concludes that UD is a new concept among university libraries in Ghana. This corresponds with Prosper (2017)'s and Adom (2022)'s findings in Ghanaian education environments.

The non-compliance with UD principles in Ghanaian university libraries stems from structural issues, limited budgets, low awareness of UD, and policy barriers. University librarians, development officers, and disability unit staff report that most Ghanaian academic libraries were not originally designed as UD compliant. Consequently, it is generally more cost-effective to incorporate UD principles during the initial stages rather than retrofitting existing structures for full compliance. This aligns with Gawronski (2014)'s findings, which showed that retrofitting caused problems and was seen as unattractive and costly at Colorado State University. This reflects the practical and aesthetic challenges faced by academic libraries in Ghana. Additionally, budget constraints are frequently cited as a major obstacle to implementing UD, both in Ghana and across the Global South. Findings note that UD is considered expensive to implement.

However, Ielegems and Vanrie (2024) argue that UD is most affordable when integrated from the onset of new library buildings. Continued absence of UD philosophy results in the ongoing creation of inaccessible spaces that exclude students with disabilities. Another fundamental barrier is the lack of awareness and expertise, as Dempsey et al. (2023) highlight a limited understanding among educators of UD's benefits. Although disability rights legislation exists in Ghana, there is a significant gap between policies and their enforcement. Accessibility standards are often seen as optional guidelines without effective en-

forcement mechanisms. These findings are connected to SMD, which challenges the inflexible institutional policies and procedures that fail to accommodate disability as an expected circumstance of one's diversity. This study advocates for the implementation of SMD, UD principles, and the IFLA checklist for access to libraries for persons with disabilities by university libraries, to promote the inclusion and full participation of disabled students in tertiary education.

5.2. Benefits of Universal Design Principles in University Libraries

UD philosophy in academic libraries has provided numerous benefits for users, especially those with disabilities. Building on the Centre for Excellence in Universal Design (n.d.), findings from university librarians, development officers, and disability officers in Ghana have recognized that UD eliminates discrimination and marginalization, promotes barrier-free environments that accommodate diverse individuals in university libraries, advances equity and inclusion of persons with disabilities in higher institutions, and fosters independence among individuals with disabilities to thrive in learning. This results in fairness in university libraries and higher education institutions. The assertion that UD is a proactive approach that creates inclusive environments benefiting everyone aligns with global studies from Oldham (2019), Ackah-Jnr (2020), and Burgstahler (2014). From the Social Model perspective, libraries are required to remove barriers that hinder students with disabilities and promote equitable, inclusive environments that benefit all, regardless of their abilities.

However, these benefits provide relevant evidence to enhance the understanding of the present state in Ghana by unveiling a critical disconnect. While some authors (Burgstahler, 2014; Spina, 2021) and organisations such as the Centre for Excellence in Universal Design (n.d.) have universally acknowledged the benefits of UD principles, their practical application in the Ghanaian academic library context is abysmal. The studies of Chrzanowska (2020) and Adom et al. (2023) affirm the power of UD to solve various accessibility issues and eliminate restrictions for the effective learning of differently abled students. The gap that exists between UD's recognition and implemented practice highlights the current state of institutional inertia among academic libraries in Ghana. Hence, the current study findings in Ghana support the global debate that awareness of UD's benefits is inadequate to drive change. This state is characterized by systemic barriers such as budget constraints and a lack of enforceable policy that prevent the translation of this concept into library design and service delivery. This suggests that future efforts ought to go beyond advocacy to seek how to implement UD in the academic library context.

6. LIMITATIONS OF THE STUDY

This research study was conducted in only ten Ghanaian public academic libraries. Hence, generalizing the findings to other similar higher education institutions is limited.

Participants in the web-based questionnaire responded on their own accord, except for those students with visual impairments, who were accommodated using alternative measures. The tendency of some participants not to disclose disability status, or fatigue from the instrument's length, led to a higher dropout rate, which may limit the results.

7. IMPLICATIONS OF THE STUDY

UD application in libraries is a new phenomenon in Ghanaian university libraries. This has several implications for libraries and librarians, and notable among them are the knowledge, awareness, and experience required to put into practice.

Firstly, the findings are useful to university librarians in awareness creation of the adoption of UD as a strategy to support the learning of differently abled students among academic libraries in tertiary institutions.

Secondly, to achieve inclusive library resources and services that do not discriminate and stigmatize students with disabilities, this calls for the training of library staff in disability issues and UD. This will provide the support, understanding, and skills required to make resources, facilities, and services marketable, accessible, and usable by diverse people regardless of their abilities.

Thirdly, there is a need to strengthen policy and enforcement. Mandatory UD and accessibility standards implementation must be linked to accreditation or funding as enforcement incentives.

8. CONCLUSION AND RECOMMENDATIONS

This study examined the UD of academic libraries to accommodate differently abled students in ten Ghanaian Universities. The study concludes that UD is a new concept among university libraries and librarians, as there was a lack of awareness and minimal application of the

UD principles for the design of their facilities, resources, and services to make them accessible and usable to all individuals irrespective of their abilities. UD not only helps eliminate discrimination and marginalisation but also allows the independence of individuals with disabilities to thrive in learning, resulting in promoting fairness in university libraries and higher institutions.

The study recommends the enforcement of disability policies and accessibility standards by stakeholders such as the Ghana Tertiary Education Commission, university administrators, quality assurance officers, development officers, and university librarians to support access and independent use for differently abled students in academic libraries.

The study highlights the necessity for adequate budget allocation by university management and the government for redesigning library facilities and services to enable the inclusion and equal participation of students with disabilities. There is a need for academic libraries to invest in training library staff in UD to enable the adequate provision of accessible environments and resources to enhance the learning experience of differently abled students.

8.1. Contribution and Originality of the Study

This study contributes to filling the gap in the literature on the extent to which the principles of UD are implemented in university libraries to accommodate differently abled students.

The study is original as it applied theoretical triangulation to determine how Ghanaian academic libraries conform to UD principles to accommodate differently abled students using the IFLA Checklist for Access to Libraries for Persons with Disabilities and SMD.

8.2. Suggestions for Further Research

This study focused on Ghanaian public university libraries. It is suggested that further studies on whether the products, services, built environments, and communication systems of other types of libraries conform to UD to accommodate differently abled students should be done.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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Who Adopts Generative AI Chatbots and Why? An Empirical Analysis of Socio-Technological Predictors

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ABSTRACT

Generative AI chatbots, such as ChatGPT and Gemini, mark a structural shift in human–computer interaction and information-seeking behavior by enabling natural-language–mediated automation of cognitive tasks. This transformation highlights the need to understand how such technologies diffuse within the general population. Drawing on the Diffusion of Innovations (DOI) theory, the Motivated Consumer Innovativeness (MCI) framework, and the Unified Theory of Acceptance and Use of Technology (UTAUT), this study examines the early adoption of AI chatbots in South Korea using a nationally representative sample of 8,690 respondents from the 2024 Korean Media Panel Survey. The findings reveal a distinct socio-technological profile of early adopters: Individuals with a diverse media repertoire and high participatory literacy are significantly more likely to adopt. The results also show a negative association between cognitive innovativeness and adoption, alongside a positive association between effort expectancy and adoption. Interpreted through the concept of cognitive economy, these findings suggest that early adoption may be driven less by intellectual exploration than by the perceived ease and efficiency with which AI chatbots support routine information tasks. The study refines diffusion theory by suggesting that innovativeness may operate differently depending on whether a technology is perceived as expanding or substituting for users' cognitive activity.

Keywords: ChatGPT, generative AI chatbots, early adopters, cognitive economy, diffusion of innovations, Korean media panel survey

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1. INTRODUCTION

Since the public release of ChatGPT in November 2022, generative artificial intelligence chatbots (hereafter AI chatbots) have emerged as a transformative force within contemporary information environments (OpenAI, 2022). Unlike conventional information systems that rely on keyword-based retrieval, AI chatbots enables users to engage with information through natural language interaction. This transition reconfigures the processes of information seeking, processing, and management. Such a shift represents not only a technological advancement but also a structural transformation in how individuals interact with and make sense of information.

More broadly, the integration of AI chatbots into everyday contexts reflects an ongoing transition from traditional computer-mediated communication (CMC) toward human–machine interaction (HMC), in which intelligent systems assume an increasingly active role in mediating information practices (Guzman & Lewis, 2020). Within this paradigm, information technologies are no longer passive intermediaries but interactive agents that participate in and shape users' cognitive and informational activities. Accordingly, understanding the adoption and use of AI chatbots has become a critical concern within information science.

1.1. Generative AI Chatbots

Generative AI chatbots constitute a distinct class of computational systems grounded in large language models (LLMs), which are trained on extensive textual corpora to capture linguistic patterns and generate human-like responses. Unlike rule-based or retrieval-based systems that depend on predefined scripts or database queries, AI chatbots leverage advanced deep learning architectures to produce adaptive and coherent outputs in real time (see Ray, 2023 for the technical background).

These systems demonstrate increasing capability across a wide range of functions, including information retrieval, text generation, summarization, translation, and analytical reasoning (OpenAI, 2026). Their ability to sustain multi-turn interactions distinguishes them from traditional search engines, enabling more iterative and dialogic forms of engagement. As cognitive support systems, they lower technical barriers and facilitate complex, multi-step tasks across various professional and personal contexts (Baber et al., 2024; Dwivedi et al., 2023; Kasneci et al., 2023; Noy & Zhang, 2023).

1.2. Research Objectives

While research on AI chatbots is rapidly expanding, much of the literature has focused on application outcomes in specific domains such as education, healthcare, and business (Baber et al., 2024; Baig & Yadegaridehkordi, 2024; Basulo-Ribeiro & Teixeira, 2024; Ray, 2023). Across these contexts, scholars have highlighted both the practical utilities and ethical challenges associated with embedding AI chatbots into institutional practices, including issues of information quality, epistemic trust, and algorithmic bias.

Despite these advancements, limited understanding remains of who adopts these systems and what informational motivations underlie their adoption. Existing empirical studies have predominantly relied on student samples or specific contexts (Bouteraa et al., 2024; Hadi Mogavi et al., 2024; Lee et al., 2025; Raman et al., 2024). Although valuable, these studies offer only a partial account of how AI chatbots diffuse within the general population and become embedded in everyday information-seeking practices. This limitation is particularly important for information science because AI chatbot adoption reflects a fundamental shift in how individuals seek, evaluate, produce, and manage information.

To address this gap, this study examines the adoption patterns of AI chatbots at the population level using data from the 2024 Korean Media Panel Survey, a nationally representative dataset. South Korea provides a particularly relevant context for this investigation, given its high digital connectivity and rapid diffusion of emerging technologies.

Guided by the Diffusion of Innovations (DOI) theory, the Motivated Consumer Innovativeness (MCI) framework, and the Unified Theory of Acceptance and Use of Technology (UTAUT), this study examines four factors: media repertoire, media literacy, individual innovativeness, and technology acceptance (Rogers, 2003; Vandecasteele & Geuens, 2010; Venkatesh et al., 2003). Together, these factors capture both users' existing information practices and their dispositional and perceptual orientations toward technological innovation.

Specifically, this study addresses the following research questions:

- RQ1: How does media repertoire diversity predict the early adoption of AI chatbots?
- RQ2: How do different dimensions of media literacy predict the early adoption of AI chatbots?
- RQ3: How do different dimensions of individual

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innovativeness predict the early adoption of AI chatbots?
- RQ4: How do technology acceptance factors predict the early adoption of AI chatbots?

By addressing these questions, this study contributes to a deeper understanding of technological diffusion in contemporary information ecosystems.

2. THEORY

2.1. Literature Review on the Adoption of AI Chatbots

A dominant stream of research utilizes the UTAUT framework to explain the adoption of AI chatbots. Park et al. (2023) provided a foundational study of South Korean users in their 20s to 40s, finding that performance expectancy, social influence, and hedonic motivation were significant predictors of the intention to use ChatGPT. Jhee and Kim (2025) further extended this framework by incorporating psychological mediators; their results showed that performance expectancy and social influence positively affected flow (immersion), which subsequently influenced satisfaction and acceptance intention. Bouteraa et al. (2024) examined ChatGPT adoption in higher education across six ASEAN countries by integrating UTAUT and Social Cognitive Theory (SCT), showing that performance expectancy, social influence, self-efficacy, and personal anxiety positively influenced its usage, whereas academic integrity had a negative effect. Alarefi and Alharbi (2025) built upon this line of research by examining educational AI tool adoption among Saudi university students, incorporating the Technology Acceptance Model (TAM), UTAUT, and SCT.

Alongside UTAUT-based approaches, researchers have leveraged DOI theory to understand the adoption of AI chatbots as emerging innovations within social systems. Raman et al. (2024) applied DOI to university students' ChatGPT adoption and showed that relative advantage, compatibility, ease of use, observability, and trialability influenced students' adoption and perceptions. The concept of MCI complements DOI by specifying the motivational dimensions of individual innovativeness that may drive innovation adoption. Liao (2026) used MCI to examine AI adoption across several AI devices, including chatbots, and found that functional, hedonic, cognitive, and social innovativeness were positively associated with AI usage experiences and consumer commitment.

Empirical studies on AI chatbot adoption have been especially concentrated in higher education. Hadi Mogavi et al. (2024) qualitatively examined early adopters' use and perceptions of ChatGPT in educational contexts, showing that productivity, efficiency, and ethics were central themes, alongside concerns about overdependence and weakened critical thinking. Lee et al. (2025) examined college students' motivations and perceived affordances of ChatGPT, finding that using the tool as a study guide and for active interaction predicted actual usage levels; students also recognized its usefulness for organizing ideas and clarifying concepts, while noting limitations related to reliability, accuracy, and critical thinking.

Despite these contributions, several limitations remain. First, because many studies focus on students or higher education, they provide limited evidence on how AI chatbots diffuse within the general population (Alarefi & Alharbi, 2025; Bouteraa et al., 2024; Hadi Mogavi et al., 2024; Lee et al., 2025; Raman et al., 2024). Second, much of the literature examines usage intentions or acceptance intentions rather than actual adoption behavior (Jhee & Kim, 2025; Park et al., 2023; Raman et al., 2024). Third, prior research has paid relatively little attention to users' pre-existing information environments, including media-use patterns or media repertoire diversity. Yet, AI chatbots are adopted within existing media and information practices, not in isolation. Fourth, the role of media literacy in AI chatbot adoption remains underexamined. Using AI chatbots requires not only access but also the ability to formulate prompts, interpret outputs, evaluate information credibility, and integrate AI-generated content into one's own practices.

Addressing these gaps, the present study examines early AI chatbot adoption at the population level using nationally representative survey data. By focusing on actual use and incorporating media repertoire diversity, media literacy, innovativeness, and technology acceptance factors, this study conceptualizes AI chatbot adoption not only as a form of technology acceptance but also as a socio-technological information behavior shaped by users' existing media environments, literacy, innovation-related motivations, and evaluations of new technologies.

2.2. Theoretical Framework

To explain the early adoption of AI chatbots, this study integrates perspectives from DOI theory, the MCI framework, and UTAUT (Rogers, 2003; Vandecasteele & Geuens, 2010; Venkatesh et al., 2003). This integrated framework is necessary because AI chatbot adoption involves both users' existing information practices and their evaluations of a novel technological system. From

an information behavior perspective, AI chatbots function as emerging information tools that may reshape how individuals seek, evaluate, produce, and manage information (Dwivedi et al., 2023; Kasneci et al., 2023; Ray, 2023). Therefore, their adoption should be examined in relation to users' pre-existing media environments, including the diversity of media channels they use and their ability to access, evaluate, and create information (Lin et al., 2013; Livingstone, 2004; Taneja & Webster, 2016).

DOI theory provides a macro-level explanation of how innovations spread across social systems and why early adopters play a critical role in reducing uncertainty surrounding new technologies (Rogers, 2003). In this study, DOI is used to conceptualize AI chatbot users in the current diffusion stage as early adopters and to explain how informational exposure and readiness may facilitate early uptake (Li, 2015; Rogers, 2003). However, DOI alone provides limited explanation of the specific motivations and system-level evaluations that drive adoption. Therefore, this study supplements DOI with the MCI framework, which captures individual motivational dispositions toward innovation, and UTAUT, which explains technology-specific acceptance through perceived performance, ease of use, social influence, and facilitating conditions (Vandecasteele & Geuens, 2010; Venkatesh et al., 2003).

Together, these perspectives allow this study to examine AI chatbot adoption through three complementary dimensions: informational conditions, dispositional motivations, and technology-specific evaluations. Media repertoire and media literacy represent users' informational conditions, reflecting their existing patterns of media use and competencies for navigating information environments (Lin et al., 2013; Livingstone, 2004; Swart et al., 2017; Taneja & Webster, 2016). MCI captures dispositional motivations for engaging with new technologies (Liao, 2026; Vandecasteele & Geuens, 2010). UTAUT factors represent users' cognitive evaluations of new technologies as useful, easy to use, socially supported, and technically accessible (Bouteraa et al., 2024; Jhee & Kim, 2025; Park et al., 2023; Venkatesh et al., 2003). This framework therefore addresses both who adopts AI chatbots and why they do so.

2.3. Informational Conditions of Early Adoption: Media Repertoire and Media Literacy

Rogers' (2003) DOI framework provides a foundational explanation of how new information technologies spread within social systems. Within this framework, early adopters are conceptualized as individuals who adopt an innovation before it becomes widely normalized, thereby playing an important role in reducing uncertainty and shaping broader usage norms (Rogers, 2003). This conceptualization is particularly appropriate in the Korean context, where national survey data indicate that 13.7% of South Koreans reported using AI chatbots in 2024, with ChatGPT accounting for the majority of reported use (Korea Information Society Development Institute [KISDI], 2024). Given that Rogers (2003) categorizes the first 2.5% of a population as innovators and the subsequent 13.5% as early adopters—cumulatively representing the initial 16% of adopters—current AI chatbot users in this dataset can be analytically classified as early adopters. Consequently, in this study, early adoption refers to the use of AI chatbots during the initial stage of their diffusion into the general population.

A key characteristic of early adopters is their greater exposure to information and stronger tendency to seek knowledge about emerging innovations (Rogers, 2003). Compared with later adopters, early adopters are typically more cosmopolitan, more connected to diverse information sources, and more likely to scan their environments for new technologies (Li, 2015; Rogers, 2003). In contemporary digital environments, these characteristics can be examined through media repertoire diversity, which refers to the range of media and information channels an individual regularly uses (Taneja & Webster, 2016). Individuals with more diverse media repertoires are likely to have broader exposure to digital platforms, information formats, and technological trends (Swart et al., 2017), thereby increasing their chances of encountering and experimenting with AI chatbots.

Beyond exposure to diverse information sources, early adoption may also depend on users' ability to navigate, evaluate, and integrate new information technologies into their existing practices. Early adopters typically possess strong cognitive and informational capacities that enable them to interpret and evaluate new technologies more effectively than later adopters (Rogers, 2003). From this perspective, media literacy—defined as the ability to access, analyze, evaluate, and create messages in various forms (Livingstone, 2004)—functions as a critical competence that lowers the cognitive and technical barriers associated with unfamiliar systems. This literacy is a multidimensional construct encompassing operational, participatory, and critical competencies (Livingstone, 2004; Lin et al., 2013).

First, operational literacy refers to the technical proficiency required to navigate digital interfaces and manage

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software effectively. It serves as a foundational skill that reduces technical friction; users with high operational literacy are more likely to perceive AI chatbots as easy to use, a key predictor of early adoption (Raman et al., 2024). Second, participatory literacy reflects engagement in digital content creation and social interaction. Because AI chatbots can serve as cognitive scaffolds for drafting, brainstorming, and refining ideas, they may be particularly attractive to users who already maintain active participatory practices (Kasneci et al., 2023; Lee et al., 2025). Third, critical literacy involves evaluating the credibility and implications of digital information. While critically literate users may be more aware of AI-related risks, such as algorithmic bias, this awareness may also enable them to manage uncertainty and integrate the technology in a more informed and controlled manner (Ashley et al., 2013; Shin, 2021).

Taken together, media repertoire diversity and media literacy constitute important informational conditions for early adoption. Individuals who are exposed to diverse media environments and possess stronger multidimensional literacy competencies are better positioned to encounter, evaluate, and incorporate generative AI chatbots into their everyday information practices.

- H1: Individuals with a more diverse media repertoire are more likely to be early adopters of AI chatbots.
- H2a: Individuals with higher operational literacy are more likely to be early adopters of AI chatbots.
- H2b: Individuals with higher participatory literacy are more likely to be early adopters of AI chatbots.
- H2c: Individuals with higher critical literacy are more likely to be early adopters of AI chatbots.

2.4. Dispositional Motivations for Early Adoption: Motivated Consumer Innovativeness

While media repertoire and media literacy capture users' informational conditions, they do not fully explain the motivational orientations that drive individuals to try new technologies. To address this dimension, this study draws on the MCI framework, which identifies four motivational drivers of innovation adoption: functional, hedonic, social, and cognitive innovativeness (Vandecasteele & Geuens, 2010).

Functional innovativeness refers to the tendency to adopt innovations for practical benefits, such as efficiency, convenience, and performance improvement (Vandecasteele & Geuens, 2010). In the context of AI chatbots, functionally motivated users may adopt these systems because they support information search, summarization, writing, planning, and productivity (Kasneci et al., 2023; Lee et al., 2025; Noy & Zhang, 2023).

Hedonic innovativeness refers to the tendency to adopt innovations for enjoyment, excitement, and emotional gratification (Vandecasteele & Geuens, 2010). Because AI chatbots provide interactive, conversational, and often novel experiences, users with higher hedonic innovativeness may be more likely to experiment with them (Jhee & Kim, 2025; Lee et al., 2025).

Social innovativeness refers to the tendency to adopt innovations to gain social recognition, express uniqueness, or enhance one's social identity (Vandecasteele & Geuens, 2010). Given the public visibility and cultural salience of AI chatbots, socially motivated users may adopt them to signal technological sophistication or remain aligned with emerging social norms (Raman et al., 2024; Rogers, 2003).

Cognitive innovativeness refers to the tendency to adopt innovations for intellectual stimulation and curiosity (Vandecasteele & Geuens, 2010). AI chatbots can satisfy this motivation by allowing users to explore ideas, ask complex questions, test system capabilities, and engage in interactive knowledge discovery (Kasneci et al., 2023; Lee et al., 2025; Liao, 2026).

- H3a: Individuals with higher functional innovativeness are more likely to be early adopters of AI chatbots.
- H3b: Individuals with higher hedonic innovativeness are more likely to be early adopters of AI chatbots.
- H3c: Individuals with higher social innovativeness are more likely to be early adopters of AI chatbots.
- H3d: Individuals with higher cognitive innovativeness are more likely to be early adopters of AI chatbots.

2.5. Technology-Specific Evaluations: Technology Acceptance Factors

Although innovativeness captures relatively stable motivational dispositions, early adoption also depends on users' evaluations of new media and technologies. UTAUT explains adoption through four core determinants: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). These constructs have been widely applied in recent studies of AI chatbot adoption, showing that users' perceptions of usefulness, ease of use, social endorsement, and available support are important predictors of adoption intention and

acceptance (Bouteraa et al., 2024; Jhee & Kim, 2025; Park et al., 2023). Accordingly, users who hold more favorable evaluations of new media and technologies may be more likely to adopt emerging tools, including AI chatbots, during the early stage of diffusion.

Performance expectancy refers to the extent to which individuals believe that using a system will help them accomplish tasks more effectively (Venkatesh et al., 2003). Prior ChatGPT adoption research has identified performance-related expectations as important predictors of intention to use, and related studies suggest that users perceive AI chatbots as useful for learning, information search, writing, productivity, and task support (Lee et al., 2025; Noy & Zhang, 2023; Park et al., 2023). In the context of new media and technologies, individuals with stronger performance expectancy may therefore be more likely to adopt AI chatbots early because they generally expect emerging technologies to enhance informational and everyday task performance.

Effort expectancy refers to the perceived ease of using a technology (Venkatesh et al., 2003). Existing studies on ChatGPT adoption have shown that ease of use remains an important factor in users' acceptance of AI chatbot services, especially because intuitive interaction can lower barriers to experimentation with unfamiliar technologies (Jhee & Kim, 2025; Park et al., 2023; Raman et al., 2024). Since many new media technologies require users to learn unfamiliar interfaces, functions, and interaction patterns, individuals who generally perceive new technologies as easy to understand and operate may be better positioned to try AI chatbots at an early stage.

Social influence refers to the extent to which individuals perceive that important others expect or encourage them to use a technology (Venkatesh et al., 2003). Prior studies have applied this construct to AI chatbot adoption and found that social expectations, peer influence, and surrounding usage norms can shape users' willingness to adopt AI chatbots (Bouteraa et al., 2024; Park et al., 2023; Raman et al., 2024). As AI chatbots become increasingly visible in workplaces, schools, and social networks, individuals who are more responsive to social influence regarding new media and technologies may be more likely to adopt AI chatbots early.

Facilitating conditions refer to the perceived availability of resources and support necessary to use a technology (Venkatesh et al., 2003). In AI chatbot adoption research, facilitating conditions have been used to explain users' perceived access to the knowledge, infrastructure, and support needed to use AI chatbots (Bouteraa et al., 2024; Park et al., 2023). Reliable Internet access, digital devices, platform accessibility, and knowledge of how to use new media services may lower practical barriers to adoption. In this sense, users who perceive stronger facilitating conditions for new media and technologies may be more likely to incorporate AI chatbots into their information practices during the early diffusion stage.

- H4a: Individuals with higher performance expectancy are more likely to be early adopters of AI chatbots.
- H4b: Individuals with higher effort expectancy are more likely to be early adopters of AI chatbots.
- H4c: Individuals who perceive stronger social influence are more likely to be early adopters of AI chatbots.
- H4d: Individuals who perceive better facilitating conditions are more likely to be early adopters of AI chatbots.

2.6. Research Model

Fig. 1 presents the proposed research model. Building on the preceding theoretical discussion, this study examines the early adoption of AI chatbots as being determined by three complementary dimensions: informational conditions, dispositional motivations, and technology acceptance factors. First, informational conditions comprise media repertoire diversity (H1) and three dimensions of media literacy: operational, participatory, and critical (H2a-H2c). Second, dispositional motivations are captured through four dimensions of individual innovativeness: functional, hedonic, social, and cognitive (H3a-H3d). Finally, technology acceptance factors, grounded in the UTAUT framework, include performance expectancy, effort expectancy, social influence, and facilitating conditions (H4a-H4d). Collectively, the model explains early AI chatbot adoption by integrating users' existing media environments, literacy competencies, innovation-related motivations, and perceptual evaluations of new technologies.

3. METHODS

3.1. Data and Sample

This study used data from the 2024 wave of the Korea Media Panel Survey (KMPS), a nationally representative longitudinal survey administered by the KISDI (2024). The KMPS began in 2010 in the capital region and five major metropolitan cities in South Korea and expanded to

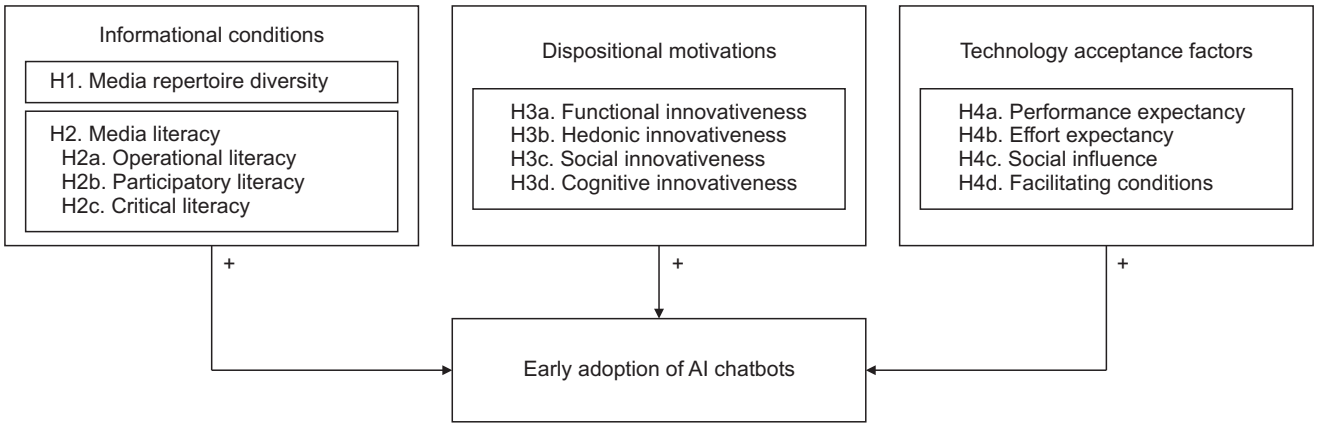


Fig. 1. Research model.

a nationwide probability sample in 2011. The 2024 survey, the 15th wave, was based on an integrated panel of 4,537 households, including 3,510 households recruited in 2011 using the 2005 Population and Housing Census sampling frame (KMPS11) and 1,027 households added in 2019 using the 2017 Census frame (KMPS19). Data were collected between May 27 and August 23, 2024, from all household members aged six or older. Because the panel is based on census-derived probability samples and periodically updated to reflect demographic changes, the KMPS provides nationally representative data on the Korean population.

The final analytic sample consisted of 8,690 respondents, of whom 4,377 (50.4%) were female. Ages ranged from 6 to 102 years (M=46.8, standard deviation [SD]=20.0). The age distribution was: under 20 (11.3%), 20-29 (11.7%), 30-39 (13.8%), 40-49 (16.2%), 50-59 (17.9%), 60-69 (15.8%), 70-79 (8.1%), and 80 or older (5.2%). In terms of education, 45.2% held a university degree, followed by high school graduates (32.3%), elementary school graduates (11.1%), middle school graduates (9.8%), and graduate degree holders (1.5%); 0.1% reported preschool education or below. The average monthly income was 1.98 million KRW (SD=1.71). Regarding economic activity, 62.46% of the respondents were employed. Among the working population, the majority were wage workers (81.57%), followed by self-employed individuals without employees (14.35%), employers (2.05%), and unpaid family workers (2.03%). Geographically, the sample covered all 17 administrative regions of South Korea, with 49.37% residing in the Seoul Metropolitan Area (Seoul, Gyeonggi, and Incheon) and the remainder distributed across major regions such as Busan (6.55%), Gyeongnam (6.55%), Gyeongbuk (5.48%), and Daegu (4.29%).

3.2. Measurements

3.2.1. Dependent Variable: Early Adoption of AI Chatbots

Early adoption was operationalized as the reported use of generative AI chatbots within the three months preceding the survey. Out of 8,690 respondents, 1,187 (13.7%) were identified as users (e.g., ChatGPT, Adot, Copilot, and Clova X), while 7,503 (86.3%) reported no usage. To maintain a strict focus on chatbots, three individuals who primarily used image-generation services (e.g., Midjourney and DALL·E) were excluded from the initial count of 1,190 generative AI users.

3.2.2. Independent Variables

3.2.2.1. Media Repertoire.

Media repertoire diversity was assessed based on respondents' usage of seven digital media platforms: social networking services (SNS), instant messaging (IM), over-the-top streaming services (OTT), online news/magazines/e-books, blogs, email, and metaverse platforms. Each medium was dichotomously coded (0=not used, 1=used). Television broadcasting was excluded from this index because all respondents reported having used it in the past three months, thereby providing no variation for the analysis. The resulting scores were summed to create a media repertoire index (ranging from 0 to 7), which represents the total number of media types used in the past three months.

3.2.2.2. Media Literacy.

The KMPS measured media literacy across three dimensions: operational, participatory, and critical literacy

(Lin et al., 2013; Livingstone, 2004). Operational literacy captures the basic functional skills required to use mobile and digital media (KISDI, 2024). Respondents assessed their ability to perform tasks such as sending text and instant messages, transferring files, configuring device settings, conducting online searches, using mobile banking and online shopping services, and managing applications. These 13 items were measured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale demonstrated high internal reliability (α=0.97, *M*=3.84, *SD*=1.20).

Participatory literacy reflects the frequency of engagement in online interaction and content creation over the past three months (KISDI, 2024). Seven types of activities were assessed, including posting, sharing, and commenting in online communities; reacting to content (e.g., 'likes'); submitting comments on news or discussion boards; providing ratings and recommendations; and contributing useful information. Responses were coded on a 9-point behavioral frequency scale (0=not a member, 1=almost never, 2=once in 3 months, 3=1-3 times per month, 4=1-2 times per week, 5=3-4 times per week, 6=5-6 times per week, 7=once per day, 8=several times per day). The scale showed high internal reliability (α=0.94, *M*=1.28, *SD*=1.09).

Critical literacy assesses the evaluative competence involved in verifying information credibility and detecting persuasive or manipulative intent (KISDI, 2024). Six items asked respondents how often they examined factual accuracy and supporting evidence, identified political or commercial biases, sought additional information from different perspectives, and recognized or avoided malicious messages such as phishing or spam attempts. Responses were recorded on a 5-point frequency scale ranging from 1 (never) to 5 (always). The scale demonstrated high internal reliability (α=0.90, *M*=3.05, *SD*=0.98).

3.2.2.3. Innovativeness.

Innovativeness was measured using the four dimensions of the MCI scale: functional, hedonic, social, and cognitive innovativeness (Vandecasteele & Geuens, 2010). Each dimension consisted of four items, rated on a 5-point Likert scale (1=strongly disagree to 5=strongly agree). Functional innovativeness assessed the extent to which respondents tend to adopt new products that offer new features, save time, improve convenience, or simplify tasks (α=0.92). Hedonic innovativeness measured the excitement, enjoyment, and sense of stimulation experienced when discovering or using novel products (α=0.91). Social innovativeness reflected consumers' tendency to adopt new products to distinguish themselves from others, impress peers, and project an image of superiority or distinctiveness through early adoption (α=0.91). Cognitive innovativeness captured the desire to engage with products that stimulate logical or analytical thinking and intellectual curiosity (α=0.94).

3.2.2.4. Technology Acceptance.

Technology acceptance was assessed using four dimensions from the UTAUT: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). Each dimension was measured with two sub-items: perceived usefulness and productivity benefits of adopting new digital media services (performance expectancy), the ease of learning and becoming familiar with such services (effort expectancy), the perceived expectations of important others (social influence), and the availability of support and resources needed for use (facilitating conditions). All items were rated on a 5-point Likert scale (1=strongly disagree to 5=strongly agree). Each subscale demonstrated satisfactory internal reliability: performance expectancy (α=0.88), effort expectancy (α=0.87), social influence (α=0.85), and facilitating conditions (α=0.88).

3.2.3. Control Variables

Four demographic variables—gender, age, income, and education—were included as control variables. Gender was coded as a binary variable (0=male, 1=female). Age was treated as a continuous variable. Income level was measured in the KMPS using 0.5 million KRW intervals comprising 18 ordered response options, ranging from 'none' and 'less than 0.5 million KRW' to '8 million KRW or more.' For regression analyses, income categories were converted into continuous values by assigning the midpoint of each interval; the open-ended top category was adjusted by adding a constant increment to the midpoint of the preceding interval to preserve interval consistency. Educational attainment was measured using six categories: preschool, elementary school, middle school, high school, university, and graduate school. Table 1 shows descriptive statistics for all variables.

3.3. Analytical Strategy

To empirically test the proposed hypotheses (H1-H4), a hierarchical binary logistic regression analysis was employed. This statistical method is appropriate given that the dependent variable, AI chatbot adoption, is di-

Table 1. Descriptive statistics for all variables (n=8,690)

Category	Variable	Range	Mean[a)]	*SD*
Dependent variable	AI chatbot adopter[b)]	0-1	0.137	0.343
Independent variables	Media repertoire	0-7	3.350	1.479
	Operational literacy	1-5	3.839	1.196
	Participatory literacy	0.43-8.00	1.278	1.090
	Critical literacy	1-5	3.055	0.976
	Functional innovativeness	1-5	2.578	0.980
	Hedonic innovativeness	1-5	2.878	0.955
	Social innovativeness	1-5	2.716	0.970
	Cognitive innovativeness	1-5	2.544	0.971
	Performance expectancy	1-5	3.159	0.972
	Effort expectancy	1-5	3.062	1.051
	Social influence	1-5	2.850	1.002
	Facilitating conditions	1-5	2.838	0.985
Control variables	Gender[c)]	0-1	0.504	0.500
	Age	6-102	46.830	19.981
	Income[d)]	0-8.25	1.977	1.711
	Education[e)]	1-6	4.158	1.019

SD, standard deviation.
[a)]For categorical variables, values represent proportions: AI adoption (1=adopter)=13.7%; gender (1=female)=50.4%. [b)]AI adoption coded as 0=non-adopter, 1=adopter. [c)]Gender coded as 0=male, 1=female. [d)]Income converted from ordinal response categories using midpoint values (unit=million KRW). [e)]Education: 1=preschool, 2=elementary school, 3=middle school, 4=high school, 5=undergraduate, 6=graduate degree.

chotomous (coded as 0=non-adopter, 1=adopter). The hierarchical approach allows for the assessment of the incremental predictive power of the key independent variables after accounting for the variance explained by demographic controls.

The regression model was constructed in two steps. In Block 1, demographic control variables—gender, age, income, and education level—were entered to establish a baseline model. In Block 2, the theoretical predictors were introduced to test the main hypotheses. These predictors included media repertoire diversity, the three dimensions of media literacy (operational, participatory, and critical), the four dimensions of innovativeness (functional, hedonic, social, and cognitive), and the four constructs of technology acceptance (performance expectancy, effort expectancy, social influence, and facilitating conditions).

Prior to the main analysis, variance inflation factors (VIFs) were examined to ensure that multicollinearity did not pose analytical concerns; all values ranged from 1.17 to 4.80, which are well below the commonly accepted threshold of 10. Therefore, multicollinearity was not considered a concern in the regression model. The overall model fit was evaluated using the likelihood ratio chi-square (χ^2) test, -2 log likelihood (-2LL), the Hosmer-Lemeshow goodness-of-fit test, and Nagelkerke's pseudo-R^2. The statistical significance and magnitude of the predictor effects were interpreted using adjusted odds ratios (AOR) with 95% confidence intervals (CI). All statistical analyses were conducted using IBM SPSS Statistics (version 31.0; IBM Corp., Armonk, NY, USA).

4. RESULTS

As shown in Table 2, a hierarchical binary logistic regression was conducted to examine the effect of media repertoire diversity, media and information literacy, innovativeness, and technology acceptance constructs on the likelihood of being an early adopter of AI chatbots (0=non-adopter, 1=adopter). The baseline model (Block 1), which included only demographic control variables

Table 2. Hierarchical binary logistic regression predicting early adoption of AI chatbots (n=8,690)

Variable	Model 1				Model 2			
	B	*SE*	AOR	95% CI	*B*	*SE*	AOR	95% CI
Constant	-3.933	0.247	0.020***		-7.654	0.419	0.000***	
Gender	-0.421	0.073	0.656***	[0.569, 0.757]	-0.504	0.078	0.604***	[0.519, 0.704]
Age	-0.073	0.003	0.930***	[0.924, 0.936]	-0.048	0.004	0.953***	[0.946, 0.960]
Income	0.166	0.025	1.181***	[1.124, 1.240]	0.104	0.027	1.109***	[1.052, 1.170]
Education	1.046	0.055	2.846***	[2.557, 3.169]	0.648	0.065	1.911***	[1.683, 2.170]
Media repertoire					0.574	0.042	1.775***	[1.633, 1.929]
Operational literacy					0.038	0.074	1.039	[0.898, 1.201]
Participatory literacy					0.212	0.032	1.236***	[1.161, 1.317]
Critical literacy					0.082	0.053	1.086	[0.978, 1.205]
Functional innovativeness					0.064	0.068	1.066	[0.932, 1.219]
Hedonic innovativeness					0.125	0.070	1.133†	[0.988, 1.299]
Social innovativeness					-0.097	0.066	0.907	[0.796, 1.033]
Cognitive innovativeness					-0.187	0.078	0.830***	[0.712, 0.966]
Performance expectancy					-0.024	0.071	0.976	[0.849, 1.122]
Effort expectancy					0.546	0.065	1.726***	[1.521, 1.960]
Social influence					0.096	0.067	1.101	[0.964, 1.256]
Facilitating conditions					-0.102	0.067	0.903	[0.793, 1.030]
Model fit statistics								
-2 Log Likelihood	5,433.421				4,886.337			
Model χ^2	1,495.731***				2,042.816***			
$\Delta\chi^2$					547.084***			
Nagelkerke R^2	0.288				0.381			
Hosmer-Lemeshow test χ^2	19.998*				28.791***			
Overall accuracy (%)	86.50				88.10			

B, unstandardized coefficient; *SE*, standard error. AOR, adjusted odds ratio; CI, confidence interval.
†p<0.10, *p<0.05, **p<0.01, ***p<0.001.

(gender, age, income, and education), was statistically significant (χ^2=1,495.731, p<0.001) and accounted for 28.8% of the variance (Nagelkerke R^2=0.288). The inclusion of the main independent variables in Block 2 significantly improved the model fit ($\Delta\chi^2$=547.084, p<0.001). The final model was highly significant (χ^2=2,042.816, p<0.001), explaining 38.1% of the total variance (Nagelkerke R^2=0.381) with a classification accuracy increasing from 86.5% to 88.1%.

Although the Hosmer-Lemeshow test indicated a lack of fit (χ^2=28.791, p<0.001), this result is frequently observed in large samples (n=8,690) due to the test's high sensitivity to minor discrepancies. Thus, model adequacy was evaluated using alternative indices. Nagelkerke R^2 improved from 0.288 to 0.381 and -2LL decreased substantially from 5,433.421 to 4,886.337, indicating that the extended predictors significantly enhanced the model fit (Δx^2=547.084, p<0.001). Furthermore, the receiver operating characteristic (ROC) curve analysis demonstrated the satisfactory discrimination ability of the final model (area under the curve=0.861, 95% CI [0.848, 0.874], p< 0.001), suggesting that the classifier effectively distinguishes adopters from non-adopters.

The results of the logistic regression analysis regarding the proposed hypotheses are as follows. First, regarding H1, the results supported the hypothesis that individuals

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with a more diverse media repertoire are more likely to be early adopters. Media repertoire diversity emerged as the strongest positive predictor among all main variables (AOR=1.775, $p<0.001$). Specifically, for every one-unit increase in media repertoire diversity, the odds of being an AI chatbot adopter increased by 77.5%, holding other variables constant.

Among the sub-dimensions of media literacy, only participatory literacy (H2b) showed a significant positive effect on adoption (AOR=1.236, $p<0.001$), indicating that a one-unit increase raises the odds of adoption by 23.6%. However, operational (H2a) and critical literacy (H2c) did not demonstrate statistically significant effects.

Contrary to expectations, the hypotheses regarding motivational drivers (H3a-H3d) were not supported in the anticipated direction. While cognitive innovativeness (H3d) emerged as a statistically significant predictor, it exhibited a negative relationship with adoption (AOR=0.830, $p=0.016$), suggesting that a one-unit increase is associated with a 17.0% decrease in the odds of adoption. Hedonic innovativeness (H3b) was marginally significant (AOR=1.133, $p=0.070$), suggesting a weak but notable relationship. Although this result did not reach the conventional significance level ($p<0.05$), it indicates a potential trend. Functional (H3a) and social innovativeness (H3c) were not statistically significant.

Within the technology acceptance variables, only effort expectancy (H4b) was a significant positive predictor (AOR=1.726, $p<0.001$); a one-unit increase in effort expectancy led to a 72.6% increase in the odds of adoption. Performance expectancy (H4a), social influence (H4c), and facilitating conditions (H4d) were not statistically significant predictors.

Regarding the control variables, all demographic factors—gender, age, income, and education—emerged as significant predictors of AI chatbot adoption ($p<0.001$). Female respondents were approximately 39.6% less likely to be early adopters compared to their male counterparts (AOR=0.604). Age showed a negative association with adoption (AOR=0.953), indicating that younger individuals are more likely to adopt AI chatbots. Education level exhibited a strong positive effect, with higher educational attainment nearly doubling the odds of adoption (AOR=1.911). Finally, income demonstrated a positive effect on the likelihood of adoption (AOR=1.109).

5. DISCUSSION

5.1. Who Adopts? Media Repertoire Diversity and Participatory Literacy

This study identifies a socio-technological profile of early AI chatbot adopters that both aligns with and extends classical diffusion theory. Consistent with Rogers' (2003) characterization of early adopters as more information-oriented and externally connected, media repertoire diversity emerged as the strongest predictor of early adoption. This finding suggests that structural exposure to heterogeneous information environments remains a foundational precondition for encountering, evaluating, and experimenting with emerging technologies (Rogers, 2003).

However, exposure alone appears insufficient in the context of AI chatbots. The significant predictive role of participatory literacy indicates that early adopters are characterized not merely by broad media exposure but also by active engagement in digital production, interaction, and content-related practices. AI chatbots increasingly function as infrastructural tools that support such activities, including drafting, brainstorming, summarizing, synthesizing, and transforming information (Kasneci et al., 2023; Lee et al., 2025; Pavlik, 2023). Consequently, early adoption of AI chatbots appears to be rooted in the combination of information openness and participatory readiness. In this sense, these tools may be especially attractive to individuals who are already engaged in active digital creation and interaction practices.

5.2. Why Adopt? Cognitive Innovativeness and Effort Expectancy

Two notable findings of this study require theoretical explanation: the unexpected negative association between cognitive innovativeness and the early adoption of AI chatbots, and the strong positive association between effort expectancy and adoption. At first glance, the former appears inconsistent with classical diffusion theory. Rogers' (2003) diffusion theory generally characterizes early adopters as individuals who are open to experimentation, attentive to new information, and capable of evaluating emerging innovations. From this perspective, cognitively innovative individuals—those motivated by intellectual stimulation, exploration, and problem-solving—would be expected to adopt AI chatbots earlier than others. However, the findings suggest that early adoption may be less closely related to a desire for cognitive challenge than to the perceived ability of these systems to reduce the cogni-

tive burden of information-related tasks.

This interpretation can be further developed through the concept of cognitive economy. Drawing on Rescher (1989)'s account of cognitive economy as the cost-effective use of intellectual resources, this study understands the concept as a tendency to conserve cognitive resources while still achieving useful outcomes. In contemporary information environments, where users often face information abundance and limited attention, technologies may become attractive not only because they provide new capabilities but also because they reduce the effort required to complete familiar tasks. AI chatbots are relevant in this regard because they can support routine information work, such as drafting, summarizing, and organizing information. Thus, early adoption may be understood less as simple enthusiasm for technological novelty than as a pragmatic response to information overload and task complexity.

The positive effect of effort expectancy offers empirical support for this interpretation. In the UTAUT framework, effort expectancy refers to the perceived ease of using a technology, whereas performance expectancy refers to expected improvements in task performance (Venkatesh et al., 2003). In this study, effort expectancy was positively associated with early adoption, while performance expectancy was not statistically significant. This pattern suggests that, at the early diffusion stage, adoption may be more closely related to the perceived ease of initial engagement than to established expectations about long-term performance gains. Early users may not yet have fully formed judgments about the broader productivity benefits of AI chatbots, but they may be able to recognize the low effort required to engage with them.

This dynamic is closely related to the interface characteristics of AI chatbots. Unlike previous digital tools that required specialized procedures or platform-specific navigation, AI chatbots operate through natural language interaction. This lowers the threshold for experimentation and reduces cognitive friction (Raman et al., 2024). Consequently, early adopters may be drawn not merely by what AI chatbots can ultimately accomplish, but by how easily they can be applied to routine tasks such as drafting and summarizing, offering immediate relief from cognitive burden.

The negative association between cognitive innovativeness can be understood from the same perspective. Cognitively innovative individuals may value intellectual exploration, analytical effort, and independent problem-solving. For these users, the value of a new technology may depend on whether it expands their cognitive capabilities or enables deeper forms of inquiry. If AI chatbots are perceived mainly as tools that simplify, automate, or substitute for parts of the cognitive process, their relative advantage may be less apparent. This does not necessarily imply that cognitively innovative users are opposed to AI technologies in general. Rather, they may be less likely to adopt early when the technology is experienced primarily as a means of reducing cognitive labor rather than extending cognitive engagement.

Epistemic concerns may further reinforce this pattern. AI chatbots can produce outputs that are fluent but inaccurate, incomplete, or difficult to verify, and prior research has noted issues such as hallucinations, factual errors, and limited transparency (Dwivedi et al., 2023). Cognitively innovative individuals may be particularly attentive to these limitations because they tend to value rigorous reasoning, independent judgment, and epistemic control. Their lower likelihood of early adoption may therefore reflect skepticism toward the reliability and verifiability of AI-generated information, rather than a lack of openness to innovation. This explanation is especially relevant to information science, where information quality, credibility, and verification are central concerns.

Taken together, these findings suggest a possible refinement of diffusion theory in the context of AI chatbots. While classical diffusion theory generally treats innovativeness as a positive predictor of early adoption, its effect may depend on whether an innovation is perceived as expanding or substituting for users' cognitive activity. Technologies perceived as cognitive-expanding may appeal to those seeking intellectual exploration and mastery, whereas technologies perceived as cognitive-substituting may be more attractive to users who prioritize efficiency and reduced mental effort. In the early adoption stage examined in this study, AI chatbots appear to be associated more closely with cognitive economy than with cognitive intensification. This interpretation connects the negative effect of cognitive innovativeness and the positive effect of effort expectancy: Early adopters may be drawn to AI chatbots less because they provide greater intellectual challenge than because they make information work easier and less cognitively demanding.

6. CONCLUSION

This study provides empirical evidence on the early adoption of AI chatbots by considering both who adopts these tools and why they do so. The findings reveal a

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distinct socio-technological profile of early adopters: Individuals with diverse media repertoires and higher participatory literacy are more likely to adopt, while effort expectancy emerges as a strong positive predictor and cognitive innovativeness shows a negative association. Together, these results suggest that early adoption is shaped not only by users' information environments and digital engagement but also by the perceived ease of reducing cognitive effort in routine information tasks.

From a policy perspective, if early adoption is partly shaped by participatory literacy and perceived ease of use, then unequal levels of digital skills may influence who benefits from AI chatbots. Policies aimed at promoting AI literacy should go beyond technical access and include support for critical, creative, and responsible use. Educational and public initiatives may need to help users understand not only how to use AI chatbots efficiently but also how to evaluate, verify, and contextualize AI-generated information. In this sense, reducing adoption barriers should be accompanied by efforts to strengthen users' capacity for informed and reflective engagement with AI systems.

Several limitations should be acknowledged. First, because this study relies on cross-sectional data, causal relationships and potential endogeneity cannot be fully established. Second, the binary measure of adoption does not capture differences in frequency, purpose, or depth of use, and cognitively innovative individuals may use AI chatbots selectively rather than reject them entirely. Third, the constructs of innovativeness and technology acceptance were operationalized using the MCI and UTAUT items from the KMPS. Although AI chatbots represented a newly emerging digital media service at the time of the survey, the items incorporated in the KMPS were intended to capture general attitudes toward new digital media products and services rather than AI chatbots specifically. Accordingly, these measures may not fully reflect AI chatbot-specific perceptions and behaviors, which should be considered when interpreting the findings. Fourth, proposed mechanisms such as cognitive substitution and epistemic risk were not directly tested. Fifth, although the model demonstrates satisfactory explanatory power and discrimination, model fit should be interpreted with caution. Finally, because the study was conducted in South Korea, the broader generalizability of the findings across different cultural and institutional contexts remains uncertain.

Future research should therefore employ longitudinal and cross-cultural designs, develop more nuanced measures of AI chatbot use, and directly examine the mechanisms linking user characteristics to adoption. Such work would help clarify how patterns of AI chatbot adoption evolve as generative AI becomes more integrated into everyday life.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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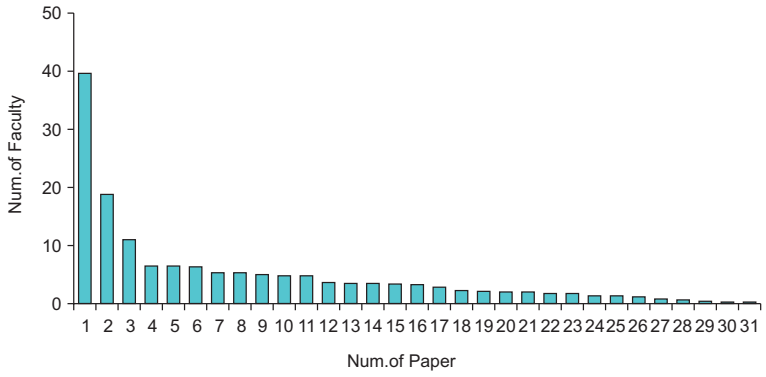


Fig. 1. Distribution of authors over publication count.

Table

Table 1. The title of table goes here

Study	Time period study	Data
Smith Wesson (1996)	1970 - 1995	684 papers in 4 SSCI journals
Reeves [a (2002)	1997 - 2001	597 papers in 3 SSCI journals
Jones Wilson [b (2011)	2000 - 2009	2,166 papers in 4 SSCI journals

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- Smith and Jones (2011) investigated...

11. Reference List :

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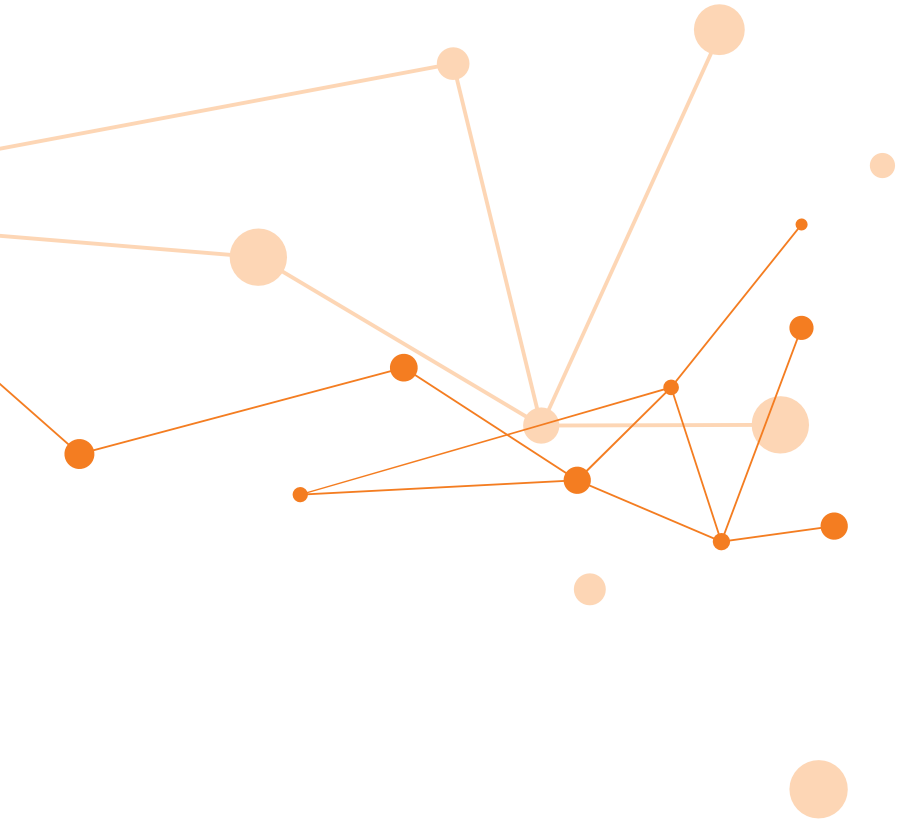
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