Competency Model for Archival Document Compilers in the Digital Era: A Postprint

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Abstract

[Purpose/Significance] The establishment of a competency model for archival literature compilation personnel in the digital era is of significant importance for selecting qualified personnel, maximizing the utilization of human resources in archival institutions, and improving the quality of archival literature compilation outcomes. [Method/Process] This study conducted an analysis of existing literature, extracted competency elements by integrating them with the workflow of archival literature compilation, revised the extracted elements through the expert consultation method, collected data using questionnaire surveys, applied exploratory factor analysis to reduce the dimensionality of the research results, and constructed the final model by drawing upon the Competency Iceberg Model and Onion Model. [Results/Conclusion] The study proposes 21 competency elements for archival literature compilation personnel in the digital era, integrating them into four dimensions: professional consciousness, knowledge, professional skills, and general abilities, thereby establishing a competency model for archival literature compilation personnel under the premise of the overall strategy of archival undertakings and the digital era.

Full Text

Abstract

[Purpose/Significance] Archival document compilation is the primary means to fully realize the value of archives. The establishment of a competency model for archival document compilers in the digital age is of great significance for selecting qualified compilers, maximizing the human resource costs of archival institutions, and improving the quality of archival document compilation products. **[Method/Process]** This study extracted competency factors through analysis of existing literature and the archival document compilation workflow, revised these factors through expert consultation, collected data via questionnaire survey, and applied exploratory factor analysis to reduce dimensionality.

The final model was constructed by referring to the Quality Iceberg Model and Onion Model. [**Result/Conclusion**] The paper proposes 21 competency factors for archival document compilers in the digital age, integrating them into four dimensions: professional awareness, knowledge, professional skills, and general ability. Considering the overall strategy of archival undertakings and the digital age context, a competency model for archival document compilers was established.

Keywords: archival document compilation; archival compilers; competency model

1 Introduction

Archival document compilation products inherit the historical culture of the Chinese nation, promote contemporary social prosperity and development, and effectively meet public utilization needs. Compilers are the principal agents of compilation activities, and their quantity and quality determine both the quality of compilation products and the development of compilation work. Meanwhile, the professional development of archival work and talent cultivation have received increasing attention. The National Archival Development "13th Five-Year" Plan emphasizes enhancing archival workforce specialization, expanding the scale of archival professional and technical personnel training, cultivating high-level and special talents, and improving archival talent evaluation mechanisms, evaluation methods, and assessment channels.

The digital age has endowed archival document compilation with new connotations and placed higher demands on compilers. Changes in the functions, modes of existence, and primary concerns of host institutions are driving role transformations for compilers. Compilers should fully understand and rapidly adapt to these new changes in digital-age compilation work, achieving innovation in their own concepts, knowledge, and skills. A competency model for digital-age archival document compilers can provide reference directions for enhancing compilers' competencies, help archival institutions solve compilation talent cultivation problems, and promote the development of archival development and utilization.

2 Literature Review

2.1 Foreign Research Status

D.C. McClelland's 1973 paper "Testing for Competence Rather Than Intelligence" brought the concept of competency to widespread attention in academic research and application fields. Representative subsequent research includes L.M. Spencer et al.'s 1993 *Competence at Work*, which summarized 20 commonly used competency factors across most industries, divided into six dimensions: achievement traits, service traits, influence traits, interpersonal insight, management traits, and personal traits. The Hay/McBer company's 1996 *Scaled*

Competency Dictionary further refined these into 18 universal competencies including achievement orientation, deductive thinking, inductive thinking, service spirit, personnel development, monitoring ability, flexibility, influence, information collection, initiative, integrity, interpersonal understanding, organizational awareness, dedication, relationship building, self-confidence, leadership, and cooperation, plus some competencies valuable mainly in specific contexts. O. Nordhaug categorized competencies into meta-competencies, general industry competencies, intra-organizational competencies, standard technical competencies, technical trade competencies, and special technical competencies.

Common methods for constructing competency models include behavioral event interviews, job analysis, scenario methods, and multi-dimensional approaches, with behavioral event interviews and job analysis being most frequently used. L.M. Spencer's Quality Iceberg Model [FIGURE:1] and R.E. Boyatzis's Quality Onion Model

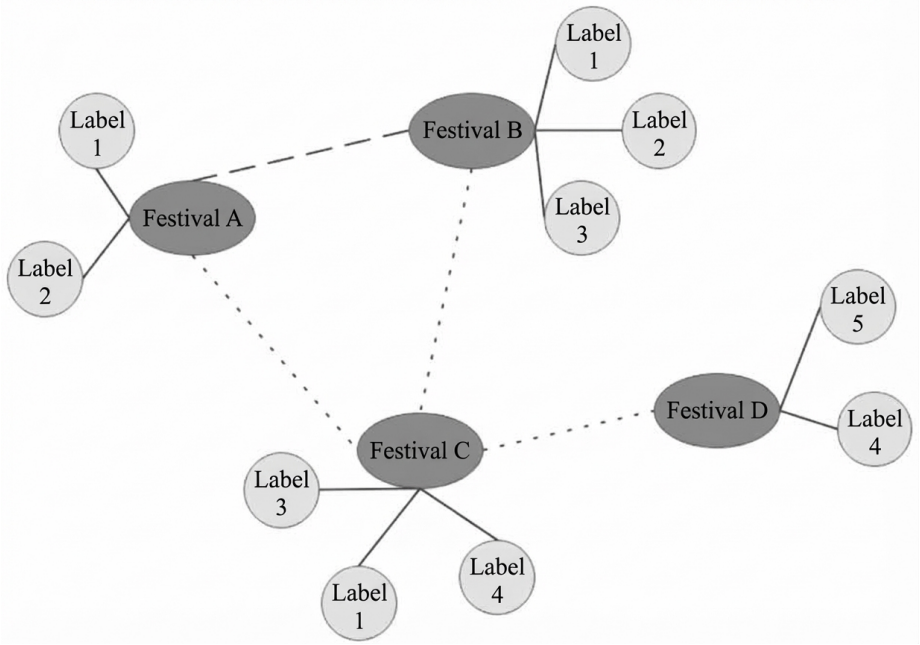

Figure 1: Figure 2

are currently the most widely applied competency models. The Iceberg Model divides competency factors into observable "above-water" aspects that are difficult to change or improve in the short term, and unobservable "below-water" aspects that can be enhanced through education or training. The Onion Model emphasizes hierarchical relationships among competency factors, with the central ring being the core that drives outer rings.

Differences exist between foreign and domestic compilation work entities. In the

United States, for example, most archives do not have specialized compilation departments or full-time archival document compilation staff; instead, individuals independently compile using archives, with government agencies, research institutions, and publishers also involved in editing and publishing archival documents. Due to these differences, few foreign studies specifically address archival document compiler competencies. Representative foreign practices regarding archivist competencies include the Australian National Archives' 2015 *Digital Information and Records Management Capability Matrix* and the internationally widely-used job analysis tool—Occupational Information Network (O*NET).

The *Digital Information and Records Management Capability Matrix* identifies capabilities that Australian government agency staff should master during comprehensive transformation to digital information management to ensure digital information remains authentic, reliable, complete, and usable. The matrix comprises three modules: capabilities all government staff should possess, capabilities communication technology experts should possess, and capabilities information and records management personnel should possess. Each module elaborates on 19 capability indicators according to common Australian public sector job levels (junior civil servants levels 1-4 and 5-6, middle-level administrative secretaries levels 1-2, and senior administrative leaders), specifying what content should be understood and what specific levels should be achieved at each of four staff levels. The 19 capability indicators are: legislative and government environment, digital transformation, information measurement, information review, information governance and business risk reduction, digital continuity, communication and leadership, business process review and analysis, user experience, technological literacy, professional technology, system information management functions, tools and techniques, standards and best practices, metadata, information risk, information retention and disposal, supervision and compliance, and information access.

The O*NET system combines "job-oriented" and "incumbent-oriented" approaches, collecting multi-angle job information through large-scale questionnaire surveys covering multiple indicator systems. Searching "Archivists" in O*NET Online yields competency factors for archivists and their report sample sources as shown in .

2.2 Domestic Research Status

Domestic research on competency models in the archival field remains limited. Representative studies include Li Cheng's competency model for archivists, comprising universal capabilities that all archivists should possess and role-specific capabilities for 12 different professional roles. Zhao Liang used the analytic hierarchy process to construct a competency indicator scale for archival work from three dimensions: archival management personnel, archival technical personnel, and archival business personnel. Han Meng divided archivist competencies into surface-level and core competency characteristics.

Currently, discussions on archival document compiler competencies in domestic literature are scattered. This study systematically reviewed and summarized compiler competency elements mentioned in domestic literature, as shown in .

Overall, existing domestic research on archival document compilation focuses on functional values, specific compilation products, specific workflow stages, and changes in digital-age compilation work, but pays insufficient attention to compilers who 贯穿 the entire compilation process and critically affect compilation product quality. Moreover, existing research primarily uses qualitative methods, lacking operability in measuring and evaluating archival document compiler competencies. Digital technology has brought transformation and challenges to traditional archival document compilation work. Compilers are crucial active agents in responding to challenges and seeking development. Therefore, it is necessary to analyze professional requirements for digital-age archival document compilers, explore their competencies, and construct a competency model to provide references for compiler evaluation, selection, assessment, training, and development.

3 Competency Model Element Extraction and Revision

A competency model refers to the combination of different competency characteristics required for a specific task role, serving as a framework and tool for competency assessment. Competency models are generally composed directly of competency elements.

This study's extraction of competency model elements for digital-age archival document compilers was based on . Through analysis of relevant literature and textual content, keywords describing archival document compiler competencies were extracted. Similar terms among these keywords were merged and integrated, element names were transformed and unified, and elements were supplemented and improved according to the archival document compilation workflow. Preliminary extracted model elements are shown in .

To further refine model elements, expert consultation and online pre-investigation were conducted on the preliminary elements in . Pre-investigation targets included archival practitioners, archival educators and researchers, archival students, and other personnel with archival backgrounds. A total of 104 questionnaires were collected, with 78 valid questionnaires (75% validity rate). The Cronbach's α coefficient was 0.953 ($>$0.7), and the KMO test value was 0.835 ($>$0.5), with Bartlett's sphericity test p-value $<$0.001, indicating sample reliability and validity met expected targets. Based on expert suggestions and analysis of open-ended questions from the pre-investigation, preliminary elements in were revised. "Archival Document Content Organization Ability" was revised to "Archival Document Organization Ability." The revised competency elements and explanations for digital-age archival document compilers are shown in .

4 Digital-Age Archival Document Compiler Competency Model

4.1 Data Collection and Descriptive Statistical Analysis

The formal questionnaire consisted of two parts: respondents' basic personal information and a survey on digital-age archival document compiler competencies. The competency survey used a 5-point Likert scale. Data were collected through online and offline methods, yielding 142 online questionnaires (131 valid) and 29 paper questionnaires (28 valid). A total of 171 questionnaires were collected, with 159 valid questionnaires (92.98% validity rate).

Descriptive statistical analysis was conducted on sample characteristics, including gender, age, education, occupation, and familiarity with archival document compilation. According to Greenhaus's career development stage theory, ages 18-25 represent the organizational entry stage, 26-40 the early career stage (focused on improving work capabilities), 40-55 the mid-career stage (reassessing work), and 55+ the late career stage (with rich achievements and experience). In this survey, the 26-40 age group accounted for 57.23% (the largest proportion), followed by the 40-55 age group at 23.9%. The main sample group possesses basic cognition and work experience in archival document compilation, with improving work capabilities as their primary task, making the age structure representative. Respondents' education concentrated at the bachelor's and master's levels (77.35% combined), indicating good educational backgrounds and knowledge literacy. Archival practitioners accounted for 52.2% (over half), and archival educators and researchers accounted for 22.64%, meeting expected proportions.

4.2 Data Analysis and Conclusions

4.2.1 Reliability and Validity Analysis SPSS 24.0 was used to verify reliability and validity. Cronbach's α coefficient was used for reliability testing, with results shown in . The Cronbach's α coefficient was 0.942 (>0.7), indicating very high questionnaire reliability. KMO and Bartlett's sphericity tests verified sample suitability for exploratory factor analysis, with results shown in . The KMO test value was 0.904 (>0.5), and Bartlett's sphericity test p-value was <0.001, reaching significant levels and indicating meaningful relationships among original variables suitable for factor analysis dimensionality reduction. Both reliability and validity met expected targets. Descriptive statistics for observed variables are shown in .

All observed variable values exceeded 4, indicating high recognition of extracted elements among archival workers. Standard deviations were all <1, showing consistent recognition of model elements and demonstrating their rationality.

4.2.2 Factor Analysis Results Discussion SPSS 24.0 was used for exploratory factor analysis of model elements. Principal Component Analysis

(PCA) extracted common factors with eigenvalues >1, using maximum variance orthogonal rotation to analyze and organize the rotated matrix, determine and name common factors, and achieve dimensionality reduction. Four common factors were extracted after rotation, with cumulative contribution rates shown in .

Variance contribution rate represents the proportion of common factor variance to total sample variance. The four common factors' cumulative variance explanation was 66.117%, indicating that dimensionality-reduced data carried most original observed variable information and could well represent original information. The four common factors had similar explanatory power for the target. The factor loading matrix after maximum variance orthogonal rotation is shown in .

As shown in , Common Factor 1 includes seven element indicators: safety awareness, legal awareness, service awareness, information awareness, social demand insight ability, professional values, and compilation planning ability. Social demand insight ability and compilation planning ability simultaneously appear in both Common Factor 1 and Common Factor 4. Factor analysis methodology stipulates that when an observed variable's rotated component matrix distributes across two common factors, the common factor most suitable to the variable's meaning should be selected. Examining the other five competency elements on Common Factor 1 reveals that safety awareness, legal awareness, service awareness, information awareness, and professional values all belong to the ideological level and guide behavior. Professional values encompass achievement orientation, political orientation, and personal positive attitudes, manifested in workers' seriousness, carefulness, and patience. Social demand insight ability and compilation planning ability emphasize thinking and ideas that influence action implementation. Therefore, these two elements were assigned to Common Factor 4, and Common Factor 1 was named Professional Awareness.

Common Factor 2 includes six element indicators: archival material processing ability, archival material verification ability, archival material selection ability, archival material retrieval ability, archival document organization ability, and archival document compilation business knowledge. Archival document compilation business knowledge simultaneously appears in both Common Factor 2 and Common Factor 3. Archival document compilation business knowledge is summarized from practical work experience, while the other five elements emphasize action systems ensuring smooth compilation workflow completion. Therefore, archival document compilation business knowledge was assigned to Common Factor 3. Meanwhile, Common Factor 2 elements focus on specific, daily task-oriented skills at the professional dimension. To distinguish factor names and properties from Common Factor 4, element names in Factor 2 were revised to material processing skills, archival material verification skills, archival material selection skills, archival material retrieval skills, and archival document organization skills. Common Factor 2 was named Professional Skills.

Common Factor 3 includes five element indicators: archival document compila-

tion business knowledge, information technology knowledge, related discipline knowledge, compilation subject domain expertise, and legal knowledge. These five competency elements represent empirical summaries of historical practice—factual and experiential information that should be mastered in compilation work. Common Factor 3 was named Knowledge.

Common Factor 4 includes five element indicators: innovation ability, learning ability, collaboration ability, compilation planning ability, and information technology application ability. These five competency elements belong to the behavioral dimension for handling non-specific, arbitrary tasks, comprehensively applying multi-faceted knowledge to solve problems. They apply not only to archival document compilation but also to excellent staff across the entire archival profession. Therefore, compilation planning ability was renamed planning ability, and Common Factor 4 was named General Ability.

4.3 Model Establishment

Generally, competency models are simple and understandable, typically composed of competency elements. Through the above analysis and discussion, competency elements and dimensions in the model are detailed in .

Reliability and validity tests for the model's four dimensions are shown in . The four dimensions contain relatively balanced numbers of competency elements, with α coefficients all >0.7 and KMO values all >0.5, indicating the four dimensions have credibility and validity and can well reflect competency element characteristics.

Referring to Spencer's Quality Iceberg Model and Boyatzis's Quality Onion Model, the digital-age archival document compiler competency model was constructed, as shown in

and

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The Iceberg Model divides the four dimensions of digital-age archival document compiler competency into above-water, observable professional compilation skills, knowledge, and general abilities, and below-water, hidden professional awareness. Professional skills, knowledge, and general abilities are explicit manifestations of archival document compilers that are easy to understand, measure, and evaluate, and relatively easier to improve through training and learning. Relative to professional skills, knowledge, and general abilities, compilers' professional awareness is embedded in personal experience, difficult to describe and measure accurately, and only manifests its value when it actively influences compilation work. Therefore, professional awareness is deeper in competency composition, hidden within compilers, difficult to change, and not easily improved through short-term training. However, this competency element has important long-term effects on compilers' professional behavior and

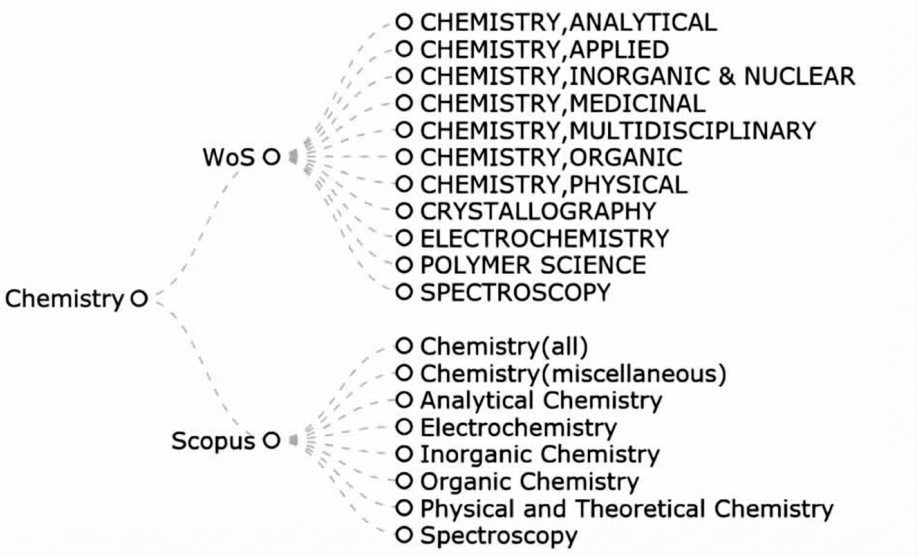

Figure 2: Figure 3

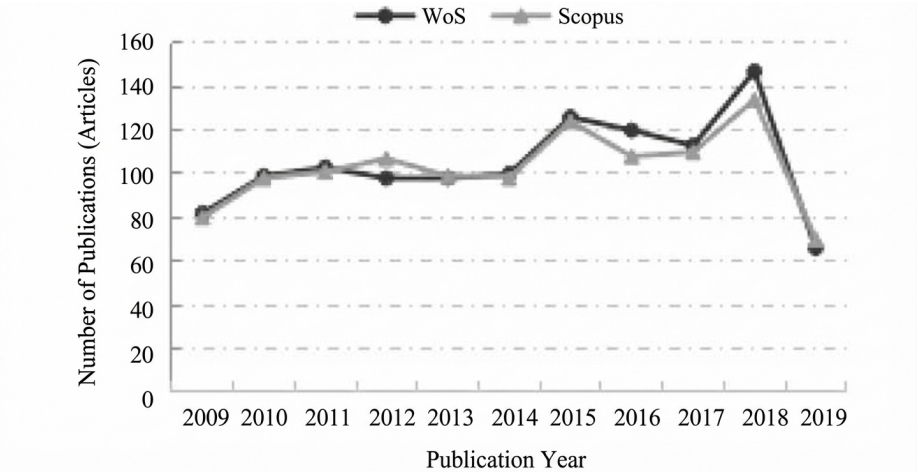

Figure 3: Figure 4

performance, serving as a key factor distinguishing compiler performance over long career cycles.

This model can provide referable and operable methods for recruiting, evaluating, and training digital-age archival document compilers. Specifically, the competency iceberg model can help archival document compilation positions identify required competency characteristics, concretize capabilities needed for compilation work, and provide bases for compiler selection. In evaluation and assessment, this model can provide foundations for establishing evaluation systems, standardizing compiler selection and career management. Both archival institutions and individuals can use this model to identify goals and directions for improving compilation professional capabilities and conduct targeted learning and training to enhance human resource quality.

The essential content of the Onion Model in

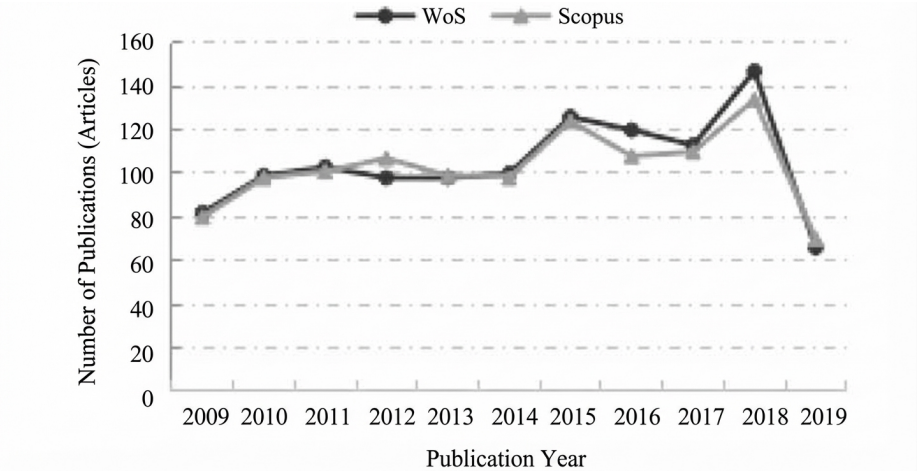

Figure 4: Figure 4

is the same as the Iceberg Model, but the Onion Model emphasizes the hierarchical nature of compiler competency, more clearly showing hierarchical relationships between hidden professional awareness and observable professional skills, knowledge, and general abilities. The outer rings are easier to examine, measure, evaluate, and cultivate. In the Onion Model, the surface layer—archival document compilation professional skills, knowledge, and general abilities—corresponds to the Iceberg Model's above-water portion and is easy to examine, measure, evaluate, and cultivate. The inner layer is compilers' professional awareness, representing the core traits and deepest competency characteristics of digital-age archival document compilers, and is the most difficult part to develop and change. Current assessment of the professional awareness dimension remains challenging; exploring methods to examine compilers' professional awareness would help predict long-term professional performance.

According to the digital-age archival document compiler competency Onion Model, in examining, measuring, evaluating, and cultivating compilers, attention should be paid not only to explicit knowledge and ability manifestations but also more carefully and cautiously to professional awareness. The Onion Model can provide foundational support for human resource management of digital-age archival document compilers, guiding the determination of competency requirements for different archival document compilation position levels through layer-by-layer analysis.

5 Research Conclusions

The increasingly extensive and deep application of digital technology in archival practice is driving transformation in archival document compilation work and changing competency requirements for compilers. This study explored the basic structure of competency elements for digital-age archival document compilers through exploratory factor analysis and constructed a competency model by referring to the Quality Iceberg Model and Onion Model. Analysis of the four dimensions' competency elements and the competency iceberg and onion models reveals:

(1) In the digital age, compilers' professional awareness is the core of their competency. Professional awareness mainly includes five competency elements: professional values, safety awareness, legal awareness, service awareness, and information awareness. These elements are not directly observable or easily acquired and improved in the short term. However, whether predicting compilers' long-term professional performance or cultivating compilation talent with long-term development potential, emphasis should be placed on improving professional awareness training.

(2) Professional compilation skills are also an important dimension of the digital-age archival document compiler competency model. This dimension includes five elements: archival material processing skills, verification skills, selection skills, retrieval skills, and archival document organization skills. These elements reflect the uniqueness and professionalism of archival document compilation work and are indispensable in compiler competency composition. In the digital age, these professional skills have richer professional connotations in scenarios of deep information technology application, with higher requirements for compilers than traditional compilation. Compilers should enhance their professional skills according to new technological conditions and professional positioning.

(3) The knowledge dimension is the third dimension of the digital-age archival document compiler competency model, mainly including five competency elements: archival document compilation business knowledge, compilation subject domain expertise, related discipline knowledge, information technology knowledge, and legal knowledge. Information technology knowledge has the highest loading coefficient in the knowledge dimension, in-

dicating that archival practitioners, educators, and researchers have recognized that archival document compilation work and compilers must inevitably adapt to digital-age development requirements. Information technology knowledge should become an important content for digital-age archival document compilers to learn and improve.

(4) General ability is a comprehensive element in digital-age archival document compiler competency composition. General abilities mainly include collaboration ability, innovation ability, learning ability, information technology application ability, social demand insight ability, and planning ability. Although these abilities lack the uniqueness and professionalism of compilation skills, they reflect compilers' comprehensive qualities and sustainable development potential. In this dimension, innovation ability's loading coefficient exceeds 0.8, significantly higher than other elements, reflecting the digital era's orientation and digital society's important professional requirements for archival document compilation work and compilers.

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Song Xueyan: Topic selection, overall research framework and structure; Li Ximeng: Paper writing, data analysis and processing; Deng Jun: Paper revision.

Figures

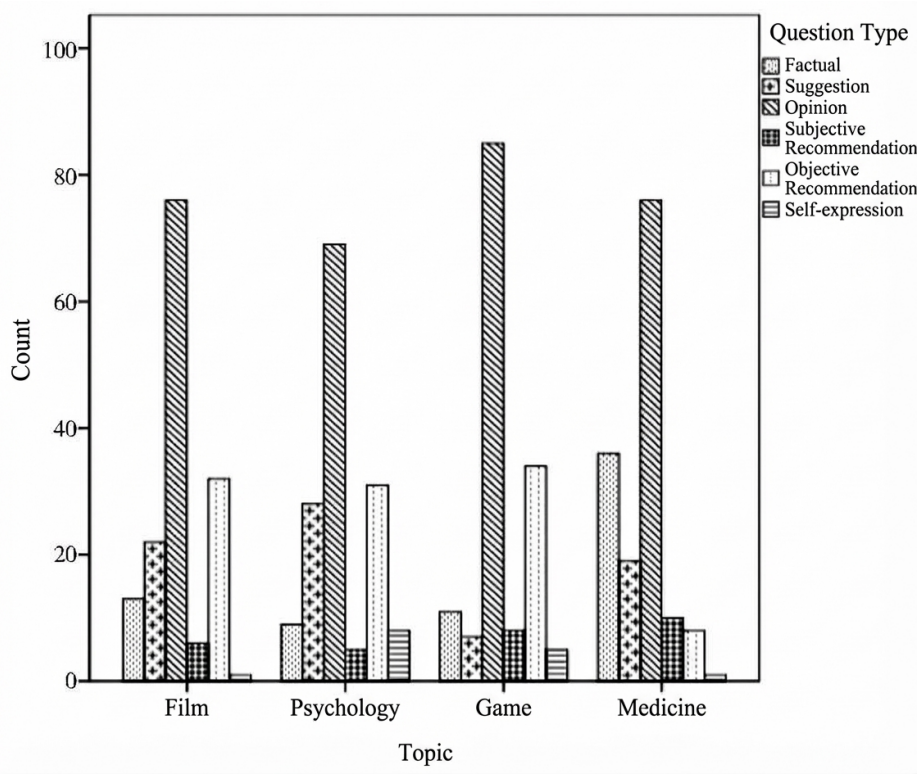

Figure 5: Figure 5