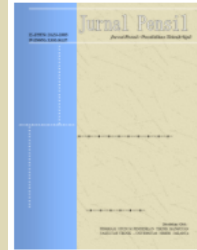


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## DIGITAL TRANSFORMATION IN CAREER GUIDANCE SERVICES: A SYSTEMATIC LITERATURE REVIEW

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### Abstract

Digital transformation in career guidance services is becoming increasingly important along with dynamic changes in the work landscape, digitalisation of industries, and more complex career readiness demands in the digital era. Despite the increasing use of technology in career guidance, there is still a gap in the systematic understanding of effective digital transformation models and how the role of career counsellors changes in the digital context. This Systematic Literature Review (SLR) used the PRISMA methodology to analyse the current literature on digital transformation in career guidance. A systematic search was conducted on the Scopus database with predefined keywords, resulting in 67 records which were then filtered into 7 high-quality articles published between 2019-2025. Findings show that digital transformation significantly improves the effectiveness of career guidance services through increased accessibility, personalisation of AI-based services, and the use of digital platforms. Four main models were identified: Cloud-based Career and Educational Guidance System (CEGS), integrated digital platforms, hybrid systems, and AI/machine learning-based systems. The role of career counsellors evolved from traditional information providers to digital facilitators requiring technological competence.

**Keywords:** Digital transformation, career guidance, systematic literature review, educational technology

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## **Introduction**

The digital age has revolutionized many aspects of life, including career guidance and professional development. Digital transformation in career guidance services is becoming increasingly important as the dynamic work landscape changes, industries digitalize, and career readiness demands become more complex (Pilege, 2023). The advancement of information technologies (IT) is reshaping every aspect of human life, including everyday activities (Grigorescu et al., 2021), international policy formulation, the economy, industry and organizational structures (Strietska-Ilina & Chun, 2021), as well as education and culture (Spurava et al., 2021).

Digital transformation refers to the integration of digital technologies into various aspects of human life that changes the way we operate and deliver value to customers (Zizikova, 2021). Some of the theories underlying digital transformation include the diffusion of innovation theory and the technology acceptance model (TAM). TAM suggests that perceived usefulness and convenience determine the acceptance of technology by users. The Going Digital Integrated Policy Framework helps governments develop an integrated approach in the digital age (OECD, 2020), while Digital HR combines social networks, mobile applications and cloud technologies to improve career services (Volianska-Savchuk O. Koshonko, 2023).

Artificial Intelligence (AI) revolutionizes career guidance by providing personalized, efficient and accessible services. AI-based career guidance systems address career decision-making and provide personalized recommendations (Deshpande et al., 2024), including chat bot services that are available around the clock as a companion to digital counselling. It conceptualizes career guidance as a dynamic and personalized support system enhanced by AI and machine learning to help facilitate informed career decisions (Bouwman et al., 2024). This framework highlights the interplay between technology accessibility and user engagement, linking digital tools to improved career development outcomes (Corvite & Hui, 2024).

Digital platforms and social media have become important tools, with career practitioners integrating Facebook, Twitter and Linked-In into their practice (Latifah et al., 2022; Kettunen et al., 2020). Augmented reality (AR) and virtual reality (VR) technologies are also expanding opportunities in training and developing chat bot services that are available around the clock as digital counselling companions (Volianska-Savchuk O. Koshonko, 2023; Lally & Sclater, 2013). Digital transformation demands comprehensive competence development from practitioners. Guidance and counselling teachers need to understand and be skilled in technology (Latifah et al., 2022), while career practitioners' competence to work in social media is increasingly important (Kettunen et al., 2020). Universities should strengthen competency-based teaching methods (Kim, 2020), although limitations in research and academic training practices hinder the development of digital competencies (Friese, 2021).

Digital natives have different expectations of career guidance services, wanting more flexible, personalized and interactive access (Donald et al., 2023). Despite the increasing use of technology in career guidance, there is still a gap in the systematic understanding of effective digital transformation models and how the role of career counselors' changes in the digital context.

This Systematic Literature Review aims to fill this gap by analyzing the current literature and providing a comprehensive synthesis of digital transformation in career guidance, specifically in three aspects: (1) the influence of digital transformation on the effectiveness of career guidance services in improving career readiness and career decision-making, (2) identification and analysis of digital transformation models that have been implemented, and (3) the evolution of the role of career counselors in the digital era and the new competencies needed.

The reason is that these three aspects are interrelated: the first aspect concerns how digital transformation affects the effectiveness of career guidance services; the second aspect concerns how digital transformation models have been applied in career guidance services; and the third aspect concerns the evolution of the role of career counselors in today's digital era. Therefore, it

is hoped that this study can provide a comprehensive synthesis of digital transformation in career guidance services.

## **Research Methods**

The objective of SLR is to identify, evaluate, and synthesize relevant research on career guidance and counseling, with a focus on effectiveness, factors influencing, and latest trends and developments in career guidance and counseling. SLR will employ a systematic and transparent methodology to identify, evaluate, and synthesize relevant research, the results of this SLR are expected to provide useful information on the effectiveness of career guidance and counseling, as well as the factors influencing its effectiveness, and the implications of this SLR are expected to contribute to the development of more effective career guidance and counseling practices, and to improve individual career outcomes.

This study adopted the Systematic Literature Review (SLR) methodology by following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses), guidelines to ensure a systematic, transparent, and replicate review process (Page et al., 2021). Unlike traditional literature reviews, which may be subjective and lack a predetermined methodology, SLR uses a systematic method to identify, evaluate and integrate findings from various research studies (Pati & Lorusso, 2017.; Shah et al., 2024). This review adopts a systematic literature methodology, selecting peer-reviewed studies that explore digital tools in career guidance (Herath et al., 2024; Liu & Cao, 2024). The inclusion criteria emphasize empirical evaluations of mobile, social, and cloud-based interventions, while the analytical framework centers on the integration of technology and user outcomes (Herath et al., 2024). The findings are organized thematically to highlight trends, challenges, and opportunities in the digital transformation of career guidance (Faldetta et al., 2021).

The literature search was conducted systematically on the Scopus database which was chosen for its broad coverage and quality of indexed journals. The search strategy used a combination of Boolean keywords that were tailored to the research focus, namely ("digital transformation" OR "digitization" OR "digital technology") AND ("career guidance" OR "career counselling" OR "career development"). This combination of keywords was designed to capture the broad spectrum of literature relevant to digital transformation in the context of career guidance, while still maintaining search specificity.

The article selection process utilized a priori defined inclusion and exclusion criteria to ensure consistency and relevance of the literature reviewed. Inclusion criteria included articles published in journals and conference proceedings, available in English, open access, and of direct relevance to the search keywords. Conversely, the exclusion criteria eliminated books and book series, publications in languages other than English, articles that were not open access, and publications that were not relevant to the focus of the research. The implementation of the selection process followed the PRISMA flow structured in several systematic stages. The identification stage produced 67 records from the Scopus database which then entered the screening stage. In the initial screening stage, all 67 records were evaluated based on source type criteria, which resulted in the exclusion of 16 records consisting of 9 books and 7 book series. The next process filtered based on publication language, excluding 13 records that did not use English.

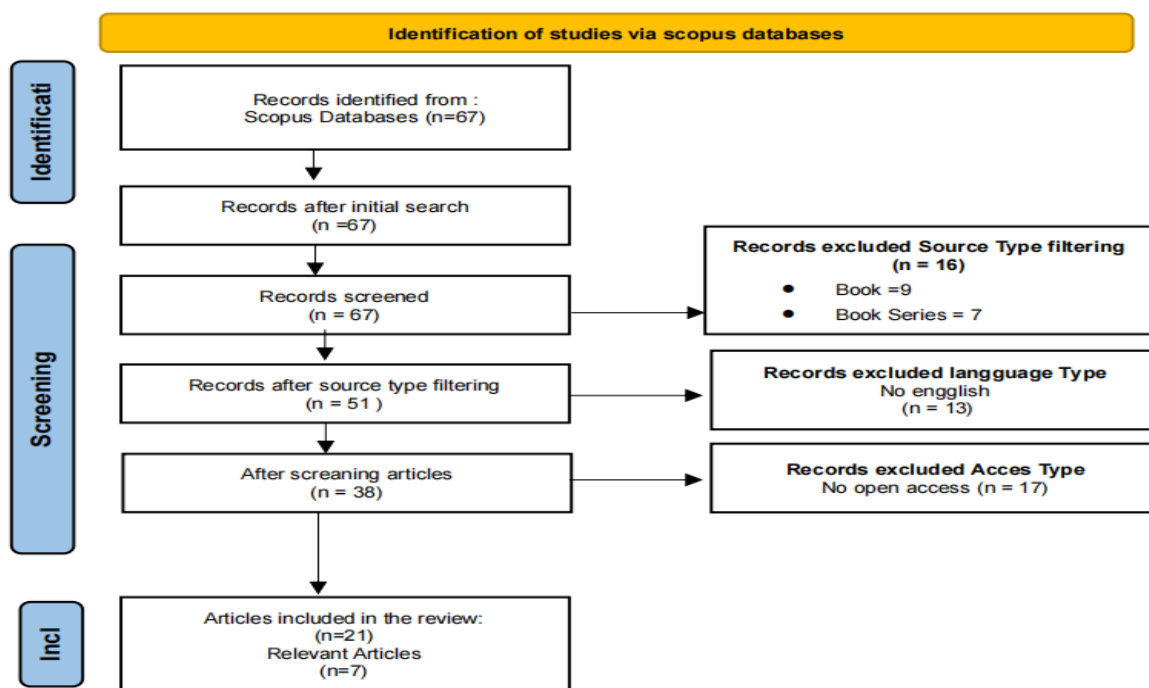


Figure 1. PRISMA Flow Diagram of Systematic Literature Review Article Selection Process

An advanced screening stage evaluated the remaining 38 articles based on access criteria, excluding 17 articles that did not have open access. This process resulted in 21 articles that met all inclusion and exclusion criteria. The final stage conducted an in-depth relevance evaluation of the 21 articles, identifying 7 articles that had high relevance and sufficient methodological quality for comprehensive analysis in this systematic literature review. The selection of seven articles from 21 was based on a thorough relevance evaluation, considering the principles of transparency, reproducibility, and relevance. The authors concluded that seven articles were worthy of further analysis because they met the standards of quality, thematic relevance, and full accessibility required for this study. By applying the principles of transparency, reproducibility, and relevance, researchers can increase the quality and trustworthiness of their research and ensure that their research has a significant impact on the field.

## Research Results and Discussion

### Systematic Literature Review (SLR) Results

Based on a systematic literature review analysis of seven studies relevant to digital transformation in career guidance, this research produces comprehensive findings on three main aspects: the influence of digital transformation on the effectiveness of career guidance services, the digital transformation models that have been implemented, and the evolution of the role of career counselors in the digital era. This analysis makes a significant contribution to understanding the dynamics of career guidance paradigm shift from traditional approaches to digital technology-based systems (Korotkova & Karabut, 2022).

Digital transformation has been proven to have a significant impact on increasing the effectiveness of career guidance services, particularly in developing career readiness and improving the career decision-making process. Donald et al. (2023) point out that digital platforms allow organizations to "reach more universities in a single virtual event, with the ability to reach up to 40-50 universities in a single activity compared to traditional geographically limited approaches" (Donald et al., 2023). Mobile applications effectively support personalized career guidance and skill development through AI-powered chatbots and interactive features (Liu & Cao, 2024; Talib et al.,

2023). These mobile apps are regarded as convenient and accessible tools that provide real-time assistance and opportunities for self-reflection (Aragon-Hahner et al., 2023). This increased reach not only reduces geographical barriers but also opens wider access to career guidance services.

The effectiveness of digital transformation in improving career readiness can be seen from the development of digital competencies integrated in the career guidance process. Bawazir et al. (2025) found a very strong correlation between digital skills and career advancement ( $r = 0.77$ ), where "91.3% of participants considered digital skills as important for career development, while 88.0% recognized that strong digital competencies open up new career opportunities" (Bawazir et al., 2025).

These findings indicate that the use of digital platforms in career guidance indirectly contributes to the development of users' digital competencies, which in turn enhances their readiness to face the demands of the digital job market. In the context of career decision-making, digital technologies have facilitated a more in-depth and systematic decision-making process. El-Sofany et al. (2020) developed a Career and Education Guidance System that uses fuzzy logic to "provide interactive tools for students to choose colleges that match their educational skills and help graduates choose careers that match their practical experience" (El-Sofany et al., 2020). This system demonstrates how technology can improve accuracy in the matching process between individual profiles and available career options.

Digital transformation has enabled the personalization of career guidance services at a level never achieved before. Panina & Dochkin (2020) propose a model that "analyzes a person's digital footprint to create an applicant profile, so as to design an individualized career path based on massive data processing of their activities on social media platforms" (Panina & Dochkin, 2020). This approach enables the identification of interests, preferences, and inclinations required for targeted jobs. This personalization is also reflected in the system's ability to provide specific recommendations based on individual characteristics, indicating an evolution from a one-solution fits-all approach towards truly personalized services (El-Sofany et al., 2020).

Digital transformation also contributes to improving operational efficiency in career guidance service delivery. Donald et al. (2023) reported that virtual approaches provide benefits such as reduced travel time, enabling teams to be more connected, improved communication, teamwork, and strategic direction. In addition, the digital approach also supports sustainability by reducing the burden of printing documents for assessment centers, making the process more sustainable (Donald et al., 2023). This efficiency is also seen in the optimization of resource allocation, where organizations can reallocate a portion of their campus and event budgets towards digital marketing, social media, targeted emails, and similar strategies (Donald et al., 2023).

The literature analysis identified four digital transformation models that have been successfully implemented in career guidance services. The first model is platform-based career guidance that integrates various stakeholders in one digital ecosystem. El-Sofany et al. (2020) developed the Career and Education Guidance System as a "cloud service that provides students with interactive tools to choose suitable colleges and helps graduates choose careers that match their practical experience" (El-Sofany et al., 2020). The system is designed with a multi-user architecture that includes four main applications: a school application for high school students, a university application for university students, a graduate application, and an administrator application to manage all system services (El-Sofany et al., 2020).

The second model identified is a multi-level digital model that integrates territorial ecosystems. Panina & Dochkin (2020) proposed "the concept of developing an intelligent multi-level information technology platform for geographically distributed models of professional orientation and professional self-determination of young people in the form of a new educational ecosystem". The model is based on the integration of existing components of the traditional career guidance system with an intelligent superstructure. Pilege (2023) explains that the digital transformation model for cultural and creative industries can be fully realized by investing in

human capital, where career guidance systems help individuals to compete in today's dynamic work environment.

A third significant model is the hybrid model that combines digital approaches with traditional face-to-face interactions. Donald et al. (2023) found that "a hybrid model for recruiting early career talent is a desirable condition following the removal of COVID-19 pandemic-related restrictions". This model recognizes that while digital transformation provides many advantages, the final interview will return to a face-to-face setting as it is easier to capture social cues from candidates. In this hybrid model, the Graduate Recruitment Attraction Matrix becomes an effective tool to map attraction activities into a four-quadrant matrix (Donald et al., 2023). The fourth emerging model is an artificial intelligence and machine learning-based system that uses advanced analytics for career guidance. Panina & Dochkin (2020) developed a model that "uses linguistic data analysis and psychodiagnostics methods to work with user data from social networks of school and first-year college students to identify their educational needs. The model integrates correlation analysis, data interpretation, and taxonomic methods in the development of algorithms for selecting and preparing data sets that ensure the formation of segmented target audiences (Panina & Dochkin, 2020).

The digital age has catalyzed a fundamental transformation in the roles and responsibilities of career counselors. This transition includes not only the adoption of new tools, but also fundamental shifts in delivery methods and skill requirements. Donald et al. (2023) identified that the role of career counselors has transformed "from face-to-face counseling to hybrid/virtual counseling, from individualized consultation to platform management, and from reactive guidance to data driven proactive advice". These changes are also reflected in the evolving interaction patterns from traditional one-on-one counseling towards synchronous versus asynchronous interaction patterns, individual versus group counseling in a virtual environment (Donald et al., 2023).

Digital transformation has resulted in new skill requirements that are substantially different from traditional counseling competencies. Bawazir et al. (2025) emphasized that "digital skills proficiency positively affects career growth among manufacturing employees, with 91.3% of participants considering digital skills important for career development". This indicates that career counselors must not only have digital literacy for themselves, but also the ability to develop digital competencies in their clients. The new competencies needed include data analysis skills to interpret career analytics, platform management to manage various digital tools, virtual counseling techniques for effective online interactions, and social media savvy (Panina & Dochkin, 2020).

Digital transformation has catalyzed the emergence of entirely new professional roles in the career guidance ecosystem. The literature analysis identified three main categories of new roles: Digital Career Coaches, Career Data Analysts, and Content Curators/Digital Strategists. Digital Career Coaches represent an evolution of the traditional counseling role with an emphasis on data-driven career planning using analytic and virtual mentoring through digital platforms (Pilege, 2023).

The Career Data Analyst is an entirely new role that focuses on Big Data processing for career trend analysis, predictive modeling for career outcomes, and market intelligence for informed career advice (Panina & Dochkin, 2020). While digital transformation offers a range of opportunities, career counselors also face significant challenges in the adaptation process. Donald et al. (2023) identified that virtual attraction activities risk organizations reaching only current students, suggesting the need for graduate recruiters to reevaluate their written communications. Key challenges include the digital divide affecting equal access to services, loss of personal touch in virtual interactions, and information overload from various digital platforms. However, opportunities for development are also substantial, including increased reach and accessibility for diverse populations, real-time data for immediate feedback, and collaboration opportunities with international career professionals.

Digital transformation also has a significant impact on job satisfaction and professional development opportunities for career counselors. Bawazir et al. (2025) found that "job satisfaction

significantly mediated the relationships between digital transformation, digital skills, technology adoption, and career growth, with employees who reported higher job satisfaction after engaging in digital transformation initiatives experiencing significantly more career advancement opportunities". This research suggests that career counselors who successfully adapt to digital transformation tend to experience higher levels of job satisfaction and professional growth (Bawazir et al., 2025).

The findings of this systematic literature review provide important theoretical and practical implications. From a theoretical perspective, this study reinforces the Technology Acceptance Model 3 developed by Venkatesh & Bala (2008), where perceived usefulness and ease of use significantly influence technology adoption in an organizational context. From a practical perspective, these findings suggest that successful implementation of digital transformation in career guidance requires a holistic approach that integrates technology adoption, human capital development, and organizational support. Bawazir et al. (2025) emphasized that organizational support plays a crucial role in helping employees adapt to the changes brought by digital transformation.

## Discussion

This systematic literature review identified several significant theoretical contributions based on the synthesis of seven primary studies analyzed. The findings from this SLR strengthen and extend the Technology Acceptance Model 3 (TAM3) developed by Venkatesh & Bala (2008) in the context of digital career guidance services. Based on the cross-study analysis, usability and ease of use factors, which are the main constructs of TAM3, were shown to not only influence technology adoption, but also directly contribute to improving the effectiveness of career guidance services, with a very strong correlation between digital skills and career advancement ( $r = 0.77$ ) as found by Bawazir et al. (2025). Through thematic analysis of the reviewed literature, this study proposes a new conceptual framework that can be referred to as the "Digital Career Guidance Ecosystem Theory" that integrates three main components based on consistent patterns found across studies: technology as an enabler, personalization as a differentiator, and multi-stakeholder collaboration as an accelerator (Howell et al., 2023).

This theoretical framework is supported by evidence from multiple studies that show that digital transformation in career guidance is not simply the application of technology, but a fundamental reconstruction of the career guidance ecosystem that involves universities, industries, and individuals in one integrated platform (Donald, 2023). From a learning theory perspective, this systematic analysis strengthens Social Cognitive Theory by showing a consistent pattern that observational learning through digital platforms can increase self-efficacy in career decision making. El-Sofany et al. (2020) demonstrated how fuzzy logic-based systems can facilitate the social learning process by providing role models and career paths that can be observed virtually, a finding that is corroborated by other studies in this review. Synthesis of the analyzed literature also contributes to the development of a theory of role transition in the digital context. The evolution of the career counselor role from the traditional reactive approach to data-driven intelligent assistant suggests a consistent transformation of professional identity found across studies, which requires a new theoretical framework to understand dynamic professional identity in the digital era.

The practical implications drawn from this systematic literature review are very comprehensive and can be applied at various levels of implementation based on the synthesis of evidence from multiple studies. At the institutional level, the cross-study analysis shows the need for balanced investment between technology and human resource development. Donald et al. (2023) identified that organizations that succeeded in digital transformation were those that were able to reallocate budgets from conventional activities towards digital marketing, email targeting, and platform management strategies, with an increased reach of up to 40-50 universities in one virtual activity - a finding that is consistent with the patterns found in the other studies reviewed.

For career guidance practitioners, this systematic review provides a concrete road map for the development of new competencies based on integrated evidence from multiple studies. The analysis shows that 91.3% of participants considered digital skills as important for career development, while 88.0% recognized that digital competencies open up new career opportunities. This meta-finding implies the need for systematic training programs that cover data analytic, platform management, virtual counseling techniques, and social media proficiency. At the policy level, the synthesis of the literature review shows the need for a regulatory framework that supports the implementation of digital transformation in career guidance. Panina & Dochkin (2020) propose a multi-level platform model that requires collaboration between stakeholders in the form of a new territorial ecosystem. The findings, which are corroborated by other studies in this review, imply the need for policies that encourage joint management between educational institutions, government, and industry (Thaller et al., 2024).

For system development, this systematic review provides an evidence-based blueprint for the design of effective career guidance platforms. The Career and Educational Guidance System (CEGS) developed by El-Sofany et al. (2020) shows the importance of a multi-user architecture that can accommodate various stakeholders with interfaces tailored to the specific needs of each user group - a consistent pattern found across multiple studies.

Cross-study analysis also identified sustainability as an important practical implication. Digital transformation was shown to provide environmental benefits through reduced traveling requirements, minimized printing of documents, and optimized use of resources. The meta findings of this review suggest that organizations can use this evidence to develop sustainable career guidance practices that align with global sustainability goals (Feroz et al., 2021).

Although this systematic literature review has been conducted following a rigorous protocol, there are some methodological limitations that need to be recognized and provide opportunities for future research. First, this review was limited to seven primary studies that met the predefined inclusion criteria, which may not cover the entire spectrum of digital transformation implementation in career guidance. The relatively limited sample size of these primary studies may affect the transfer ability and generalization of the findings, especially in different geographical and cultural contexts (Parola et al., 2024). The limited sample size reduces statistical power and may fail to capture the diverse experiences of users, restricting broader applicability (Aragon-Hahner et al., 2023; Phuttawong & Chatwattana, 2024; Aragon Bartsch et al., 2021). Research often focuses on specific regions or countries, limiting the generalizability of findings across different cultural and infrastructural contexts. This geographic concentration affects the external validity of the conclusion (Urdzina-Merca & Dislere, 2018). Moreover, most studies employ cross-sectional or short-term designs, hindering the assessment of long-term impact and sustainability of digital career guidance interventions, thereby restricting understanding of their enduring effectiveness (Liu & Cao, 2024; Cloux et al., 2023).

The second limitation relates to methodological heterogeneity in the primary studies analyzed. Variations in research design, sample size, and instruments make comparisons between studies challenging and potentially reduce the robustness of the synthesis. Future systematic reviews will need to develop standardized and more specific quality assessment criteria for digital transformation studies in career guidance, allowing for more rigorous meta-analysis. Publication bias is also an inherent limitation in this systematic literature review. There may be gray literature or unpublished studies with different or contradictory findings that were not identified in the systematic search. Search strategies limited to specific academic databases and publications in English may have excluded important studies from different geographical or linguistic contexts.

Aspects of equity and the digital divide have not received adequate coverage in the primary studies reviewed. Systematic analysis revealed significant gaps in the literature regarding how digital transformation in career guidance can exacerbate or ameliorate gaps in access to career guidance services between different socioeconomic groups. Future research needs to explore inclusive

design principles and accessibility considerations in the implementation of career guidance technology.

Based on the gaps identified in this systematic review, several future research directions can be recommended. Longitudinal studies are needed to understand the long-term impact of digital transformation on career outcomes (Nadkarni & Prügl, 2021; Reis et al., 2018). While the primary studies reviewed show short-term improvements in career readiness and job satisfaction, there is no strong evidence of sustained impact on career success and professional development (Nadkarni & Prügl, 2021). From a methodological perspective, future research needs to explore mixed method approaches that can capture both quantitative metrics and qualitative experiences of various stakeholders. This systematic review identified the dominance of quantitative approaches in primary studies, thus there is a need for qualitative studies that can provide deeper insights into user experiences and implementation challenges (Cosa & Torelli, 2024).

A very promising area of research is the development of an evidence-based ethical framework for the use of AI and big data in career guidance. Panina & Dochkin (2020) proposed the use of social media data analysis, but this systematic review identifies gaps in the literature regarding privacy implications and ethical considerations in the use of personal data for career guidance purposes. Cross-cultural comparative studies are also a research priority based on the findings of this systematic review. The literature analyzed is mostly from the Western context, so the cultural validity and applicability of the various digital transformation models in career guidance still require more comprehensive empirical validation across different cultural contexts (Einarsdóttir et al., 2020).

Finally, this systematic review identified the need to develop standardized outcome measures to evaluate the effectiveness of digital transformation in career guidance. Heterogeneity in measurement approaches across studies makes comparison and synthesis challenging, so consensus on core outcome measures is important for future research in this area.

## **Conclusion**

This systematic literature review identifies fundamental changes in career guidance services through the application of digital technologies based on an analysis of seven high-quality studies. The thorough analysis shows that digital transformation significantly improves the effectiveness of career guidance services through three main mechanisms: increased accessibility and reach of services, advanced data-driven personalization, and more informed career decision-making.

This research identifies four digital transformation models that have been successfully implemented: an integrated platform-based model, a multi-level digital model; an ecosystem based, hybrid model that combines digital and traditional approaches, and an artificial intelligence and machine learning-based model. Each model has specific advantages in different implementation contexts, with the Career and Education Guidance System and the Graduate Recruitment Attractiveness Matrix being examples of successful implementations supported by empirical evidence.

The analysis shows a fundamental evolution in the role of career counselors from traditional reactive counselors to proactive digital strategists who require expanded competencies in data analytic, platform management, and virtual counseling. Primary studies identified the emergence of new professional roles such as Digital Career Coach, Career Data Analyst, and Content Curator/Digital Strategist, indicating significant diversification in the landscape of the career guidance profession.

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