

RESEARCH ARTICLE

Exploratory analysis on data analytics careers: Current trends, prospects and challenges

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Abstract - The data analytics field has experienced exponential growth in recent years, driven by rapid technological advancements across multiple industries. However, a persistent gap remains between industry skill requirements and the availability of qualified talent. This study examines current trends in data analytics careers, evaluates future market demand, and identifies key factors influencing career prospects, including technical skill requirements, emerging technologies, and barriers facing entry-level professionals. Employing a descriptive research design, secondary data were gathered and analysed from peer-reviewed academic literature, industry benchmarks, and aggregated job-posting metrics from platforms such as LinkedIn. The findings indicate sustained demand for data analytics professionals, with employers increasingly prioritising a blend of technical competencies and essential soft skills. Primary industry challenges include escalating data complexity, ethical concerns surrounding data governance, and rapid technological turnover that accelerates skill obsolescence. Ultimately, this study underscores the need for continuous upskilling, industry-aligned curricula, and technological adaptability to support sustainable career trajectories in data analytics.

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1. Introduction

In today's digital environment, many organisations rely on data, which has increased substantially due to rapid technological advancement. As a result, data analytics has become a critical function across multiple sectors, supporting evidence-based decision-making, operational efficiency and strategic planning. Despite this growing importance, many organisations still struggle to find skilled data analytics professionals who can keep pace with rapidly evolving technologies. Demand for analytics expertise has outstripped existing upskilling and training pathways, contributing to a widening skills gap in the labour market. Technological developments in areas such as big data analytics, automation and artificial intelligence have reshaped the nature of work and employment, particularly within analytical roles. Data analytics professionals are increasingly required to update their technical competencies and adapt to emerging tools and methods to remain relevant in a dynamic work environment (Cascio & Montealegre, 2016). Prior studies indicate that professionals must possess not only technical expertise but also the ability to manage complex datasets and derive meaningful insights from large and diverse data sources (Kumar et al., 2023). In Malaysia, the growing emphasis on data analytics has led to specialised academic programs and professional certification pathways. However, individuals entering the analytics workforce often come from diverse educational backgrounds, such as computer science, mathematics or data science, which may not fully equip them with the industry-specific skill sets required for analytics roles. This mismatch between graduates' capabilities and employers' expectations is particularly evident in applied analytical skills and real-world problem-solving. The shortage of skilled data analytics professionals has tangible implications for organisations that rely on data-driven insights to remain competitive. Without adequate analytics expertise, organisations risk decision-making inefficiencies and a reduced capacity to leverage data for business value. Industry evidence suggests that organisations with strong data analytics capabilities are more likely to achieve superior performance outcomes, highlighting the strategic importance of analytics talent. Addressing this shortage therefore requires collaborative efforts among key stakeholders, including educational institutions, employers, and individuals, to better align training provision with industry needs.

Given these challenges, a structured examination of data analytics career trends, prospects, and the factors influencing workforce readiness is needed. This study adopts an applied research perspective and aims to generate insights that can be directly utilised in real-world contexts. Specifically, the study seeks to analyse current trends in data analytics careers, identify key skill requirements shaping prospects and examine the challenges faced by individuals pursuing careers in this field through a descriptive analysis of secondary data sources. This study contributes by analysing current trends in data analytics careers, identifying key skill-related factors influencing future career prospects, and examining the challenges individuals face in pursuing careers in data analytics. The remainder of this paper is organised as follows. Section II presents the literature review, Section III describes the research methodology, Section IV discusses the results and findings, and Section V concludes the study.

2. Literature Review

The rapid expansion of data analytics has attracted growing attention, particularly regarding workforce demand, skill requirements, and the evolving nature of analytics roles across industries. Existing literature widely acknowledges that data analytics plays a central role in supporting data-driven decision-making and organisational competitiveness, driven by advances in digital technologies and the increasing availability of data. As a result, research in this area spans multiple dimensions, including career trends, technological influences and workforce development challenges. Prior studies examining data analytics careers primarily focus on growth trends and industry demand, highlighting the increasing need for analytics professionals across sectors such as healthcare, finance, manufacturing and services. While these studies offer valuable insights into market expansion and employment opportunities, they often emphasise demand projections without sufficiently examining how that growth translates into clear career pathways or workforce readiness, particularly for entry-level roles. In addition, a substantial body of literature addresses skill requirements for data analytics roles, frequently distinguishing between technical competencies and soft skills. However, consensus remains limited on the relative importance of these skill categories, with some studies prioritising advanced technical capabilities while others stress communication and problem-solving. This divergence suggests that skill expectations may vary across organisational contexts and regions, indicating the need for a more integrated examination of analytics career requirements. Moreover, research addressing challenges in data analytics careers tends to examine technical, ethical or educational issues in isolation. Fewer studies synthesise these challenges within a holistic framework that links career trends, skill demands and barriers to entry and progression. Consequently, the literature remains uneven and offers limited guidance on how these factors collectively shape data analytics career development. In response, this literature review adopts a workforce-readiness perspective to synthesise existing research on data analytics career trends, key skill requirements, and associated challenges. By integrating these dimensions, the review aims to establish a coherent foundation for analysing the current state and prospects of data analytics careers.

2.1 Current Trends of Data Analytics Careers

2.1.1 Growth trend

Globally, data analytics has grown rapidly, driven by accelerated technological advancement, increasing data availability, and rising demand for data-driven insights across industries. Market forecasts indicate strong expansion of the data analytics sector, with the global market projected to reach USD 132.9 billion by 2026, growing at a compound annual growth rate (CAGR) of 28.9% (Jameel, 2023). This growth is largely attributed to the increasing volume, velocity, variety, and veracity of data, as well as the growing need for real-time and predictive analytics to support organisational decision-making (Suriyan & Ramalingam, 2022). Building on global trends, Malaysia is similarly positioned to benefit from the expansion of data analytics adoption. National digital transformation initiatives, including the National Digital Economy Blueprint (MyDIGITAL), reflect the country's strategic commitment to advancing analytics capabilities across public and private sectors. According to a study commissioned by the Malaysia Digital Economy Corporation (MDEC), Malaysia's big data analytics (BDA) market is expected to grow from USD 1.1 billion in 2021 to USD 1.9 billion by 2025 (Ministry of Communications and Multimedia Malaysia, 2023). This projected growth highlights the growing institutional and economic importance of data analytics in Malaysia. While existing studies consistently demonstrate strong market growth at both global and national levels, they primarily focus on market size and investment trends. Less attention has been paid to how this growth translates into sustainable career pathways, particularly regarding workforce readiness and entry-level opportunities in the data analytics profession.

2.1.2 Industry demand

In the era of Industry Revolution 4.0, data analytics has become a foundational capability for organisations seeking to leverage data-driven decision-making, with big data recognised as a key pillar of digital transformation. Data analytics professionals play a critical role in extracting actionable insights from large and complex datasets to support organisational performance and strategic planning (Vassakis et al., 2018). Consequently, demand for data analytics skills has expanded across diverse sectors, including healthcare, finance, retail, manufacturing and travel. Prior studies illustrate sector-specific applications of data analytics. In healthcare, analytics supports patient trend analysis and treatment optimisation, while in finance it is applied to fraud detection, risk management and customer behaviour analysis (Kim & Tomprou, 2021). Similarly, retail and manufacturing sectors use analytics for sales forecasting, inventory optimisation, and quality control, while the travel industry applies analytics to demand forecasting and pricing strategies. These findings collectively demonstrate the cross-industry relevance of data analytics skills.

From a Malaysian perspective, workforce surveys conducted by the Ministry of Human Resources indicate substantial industry demand for data analytics professionals. Survey results show that approximately 54% of small and medium enterprises (SMEs) and 45% of large organisations are likely to employ data analysts, highlighting broad-based demand across organisational sizes (Ministry of Human Resources, 2019). Despite this demand, prior research consistently reports a shortage of qualified analytics talent, particularly at the entry level, where organisations seek candidates who possess both technical expertise and business-oriented competencies (Stanton et al., 2020). Overall, these studies suggest that although industry demand for data analytics professionals is well established, challenges persist in aligning workforce supply with employer expectations. This misalignment reinforces the need to examine not only demand trends, but also the skills and challenges shaping career development in data analytics.

2.2 Key Factors Influencing Future Prospects

2.2.1 Skills requirements

A substantial body of research highlights skills availability as a critical determinant of career success in data analytics. Prior studies consistently identify technical competencies such as statistical analysis, programming, machine learning, and data visualisation—as foundational requirements for analytics roles (Russom, 2011; Stanton et al., 2020). Proficiency in programming languages such as Python, R, and SQL, as well as tools such as Tableau and Power BI, is frequently cited as essential for effective data analysis and communicating insights (Almgerbi et al., 2022). Beyond technical expertise, several studies emphasise the growing importance of soft skills in shaping analytics career prospects. Skills such as problem-solving, communication, teamwork, and business acumen are increasingly recognised as critical, as data analytics professionals are expected to translate complex analytical outputs into actionable organisational insights (Stanton et al., 2020). While some studies prioritise advanced technical capabilities, others argue that the effectiveness of analytics work is heavily dependent on the ability to contextualise findings within organisational and domain-specific settings. This divergence suggests that successful analytics careers increasingly require hybrid skill profiles that combine technical proficiency with interpersonal and cognitive skills. Sector-specific studies further reinforce this perspective. For example, analytics applications in healthcare require not only technical skills to handle large-scale clinical data but also domain expertise to support evidence-based decision-making and improve patient outcomes (Kim & Tomprou, 2021). These findings indicate that domain knowledge plays an important role in enhancing the practical value of analytics work, particularly in complex and regulated industries.

2.2.2 Advancement of data analytics technology

Technological advancements represent another key factor influencing the future of data analytics careers. The widespread adoption of big data technologies, artificial intelligence (AI), and advanced analytics tools has transformed how industries collect, process, and interpret data. Big data analytics enables organisations to manage and analyse large volumes of structured and unstructured data characterised by high volume, velocity, and variety, thereby increasing demand for professionals with specialised data management and analytical skills (Dasoriya & Samdani, 2018). The integration of AI and machine learning within analytics workflows has further expanded the skill requirements for analytics professionals. AI-driven analytics applications support predictive modelling, pattern recognition, and automation of analytical processes, enhancing organisational decision-making capabilities (González-Sarmiento et al., 2021). While concerns have been raised regarding job displacement due to automation, existing studies suggest that AI technologies more often complement human analytical roles rather than replace them, increasing the need for professionals who can design, interpret, and manage intelligent analytics systems.

In addition, emerging technologies such as deep learning and the Internet of Things (IoT) continue to reshape analytics practices. Deep learning techniques enable advanced applications in image recognition, natural language processing, and predictive analytics, particularly within Industry 4.0 environments (Duan & Da Xu, 2021). Similarly, IoT technologies generate large-scale real-time data streams, increasing demand for analytics professionals who can handle distributed data architectures and real-time analytics systems. Despite extensive discussion of individual technologies, much of the existing literature examines these advancements in isolation. Limited attention has been given to how the combined effects of skill requirements and technological change influence long-term career development and workforce preparedness in data analytics. This highlights the need for integrated analyses that link technological evolution with skill acquisition and career sustainability.

2.3 Challenges in Data Analytics

2.3.1 Data challenges

As organisations generate increasingly large and complex datasets, managing and analysing them presents significant technical challenges. Studies highlight challenges in data storage, scalability, and integration, particularly with high-volume, high-velocity, and heterogeneous data sources (Suriyan & Ramalingam, 2022). While big data technologies such as Hadoop and distributed processing frameworks offer partial solutions, extracting meaningful insights from semi-structured and unstructured data remains technically demanding. Furthermore, limitations in data infrastructure and interoperability among data systems may hinder effective analytics implementation. These constraints require analytics professionals not only to possess analytical competencies but also to understand data engineering principles and system architecture. Consequently, technical data challenges are closely linked to skill demands, reinforcing the need for broader and more specialised training pathways.

2.3.2 Ethical challenges

Beyond technical constraints, ethical considerations pose a critical challenge in data analytics practice. The increasing use of large-scale personal and organisational data raises concerns regarding privacy, data protection, and responsible data governance (Saltz & Dewar, 2019). In sectors such as healthcare and finance, improper handling of sensitive data can lead to legal, reputational, and social consequences. Bias and discrimination embedded within data-driven models further complicate analytics practice. Algorithms trained on historically biased datasets may unintentionally reinforce inequalities, particularly in recruitment, lending, and criminal justice (Vayena et al., 2015). While technological advancements enhance predictive capabilities, they simultaneously intensify ethical accountability. This underscores the importance of integrating ethical awareness and governance principles into analytics education and professional training.

2.3.3 Barriers to skill acquisitions

Beyond technical and ethical challenges, barriers to skill acquisition present substantial obstacles for individuals entering or advancing within the data analytics field. Analytics' interdisciplinary nature requires proficiency in programming, statistics, machine learning, and domain knowledge, creating a steep learning curve for newcomers. Although online courses and certification programs have expanded access to training (Almgerbi et al., 2022), the rapid pace of technological evolution means that skills may quickly become outdated. Moreover, growing competition in the job market increases pressure on early-career professionals to demonstrate both technical expertise and practical experience. Employers often seek candidates who can apply analytics in specific industry contexts, requiring domain understanding in addition to technical capability. This expectation may disadvantage graduates whose academic preparation lacks applied exposure or industry engagement. Taken together, the challenges identified in the literature suggest that technical complexity, ethical responsibility, and barriers to skill development are interrelated rather than isolated issues. Data infrastructure limitations increase technical skill requirements; technological advancements amplify ethical considerations; and rising employer expectations intensify pressure to acquire skills. Despite recognising these challenges, existing studies often address them independently, with limited integration into a unified framework for workforce readiness and sustainable career development. This fragmentation highlights the need for a more comprehensive examination of how technical, ethical and educational challenges together influence career pathways in data analytics. This integrated perspective is essential for developing strategies that support long-term workforce sustainability and professional resilience in the rapidly evolving analytics landscape.

3. Methodology

This study uses a descriptive research design based on structured secondary data analysis to examine trends, skill requirements, and challenges in data analytics careers. The descriptive approach was selected to systematically synthesise existing empirical findings and workforce evidence relevant to the research objectives. The study integrated quantitative and qualitative sources to provide a comprehensive overview of career demand patterns and workforce readiness within the data analytics profession.

3.1 Research Design

The study focuses on analysing previously published academic literature, institutional workforce reports, and job-posting data to identify patterns in industry demand and skill expectations. Rather than developing predictive models, this research interprets and synthesises existing data to generate practical insights into the current and future state of data analytics careers.

3.2 Data Sources and Search Strategy

Data were obtained from three main sources: peer-reviewed academic publications, official government and institutional reports and aggregated job-posting data from LinkedIn. We identified academic articles through database searches using platforms such as Google Scholar and Scopus-indexed journals. The search process employed keywords including “data analytics careers,” “analytics skill requirements,” “analytics workforce demand,” “big data job market,” and “analytics skill gap.” The review focused on publications from 2015 to 2024 to align with contemporary technological developments and labour market conditions. Institutional workforce evidence was sourced from recognised bodies such as the Ministry of Human Resources Malaysia and related digital economy agencies to contextualise industry demand within the national setting.

To complement the literature and workforce reports, a descriptive job-posting analysis was conducted using LinkedIn data collected over six months in 2024. Job listings were identified using the keyword “data analyst” and categorised by the platform's experience levels (internship, entry-level, associate, mid-senior, executive). We reviewed 272 job postings to examine distribution patterns across experience levels. This study uses secondary data sources to gather comprehensive information about the data analytics career landscape. Specifically, it compiled quantitative data from existing research papers that have utilised web scraping techniques to extract job postings from major job search platforms such as LinkedIn. The study also gathers qualitative data through an extensive review of industry reports and academic literature. From a Malaysian perspective, a survey conducted by the Human Resources Development Fund (HRDF) reports in its HRDF Industry Training Intelligence Report that employers demand a few key skills.

3.3 Inclusion and Exclusion Criteria

To ensure methodological transparency and credibility, the following inclusion criteria were applied:

- i) Publications between 2015 and 2024
- ii) Peer-reviewed journal articles or official institutional reports
- iii) Studies addressing data analytics career trends, skill requirements, or workforce challenges
- iv) Sources presenting empirical findings or structured analytical discussion

Sources were excluded if they:

- i) Were opinion-based blogs or non-verifiable web commentary
- ii) Lacked identifiable authorship or methodological transparency
- iii) Repeated findings already captured in included studies

This screening process ensured the analysis was grounded in credible, relevant evidence.

3.4 Analytical Approach

The study employed a structured document analysis method. Quantitative evidence was derived from workforce surveys and job-posting distributions to identify measurable trends in experience-level demand and skill requirements. Qualitative evidence was analysed using thematic synthesis, categorising findings into three analytical dimensions aligned with the research objectives:

- i) Career growth and industry demand
- ii) Skill requirements and technological influences
- iii) Professional and structural challenges

Findings were cross-referenced across academic literature, government workforce reports, and job posting data to ensure consistency and reduce source bias. This comparative approach strengthens the reliability of the conclusions drawn from secondary evidence.

3.5 Limitations

This study is limited by its reliance on secondary data and aggregated job-posting information, which may not fully capture real-time labour market dynamics. Additionally, platform-based job data reflects posted vacancies rather than confirmed hiring outcomes. Given the rapid pace of technological change in analytics, skill requirements may continue evolving beyond the timeframe examined. Future research may incorporate primary data collection methods, such as surveys or interviews with analytics professionals and employers, to further validate and extend these findings.

4. Results and Discussion

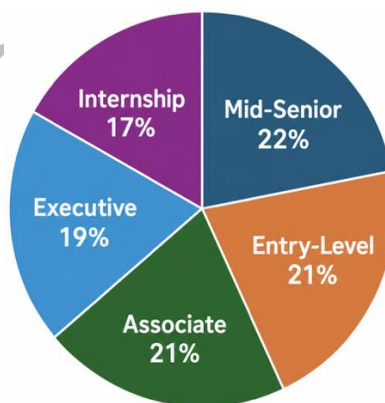
This section presents the findings derived from secondary data analysis and interprets them in relation to existing literature. The results are organised according to the study's three analytical dimensions: career growth trends, skill requirements, and professional challenges.

4.1 Career Growth and Industry Demand

The analysis confirms that data analytics continues to experience strong global and national demand. Market projections indicate sustained expansion of the data analytics sector, supported by digital transformation initiatives and increasing organisational reliance on data-driven decision-making. Within the Malaysian context, workforce reports similarly indicate substantial demand for analytics professionals across industries, particularly within digital economy sectors. To further examine workforce entry patterns, a descriptive analysis of LinkedIn job postings was conducted. The distribution of data analyst job postings by experience level shows that mid-senior roles constitute the largest share (22%). In comparison, entry-level and associate positions account for equal proportions (21% each), together representing 42% of total postings. Because associate and entry-level roles are often accessible to fresh graduates or candidates with limited professional experience, this distribution suggests the analytics labour market offers meaningful entry opportunities alongside demand for experienced professionals. Internship positions (17%) further indicate structured early-career pathways, while executive roles (19%) reflect continued need for advanced expertise. Overall, the relatively balanced spread across experience levels suggests a tiered yet inclusive workforce-demand structure within the data analytics field.

Figure 1

Distribution of job postings by experience level



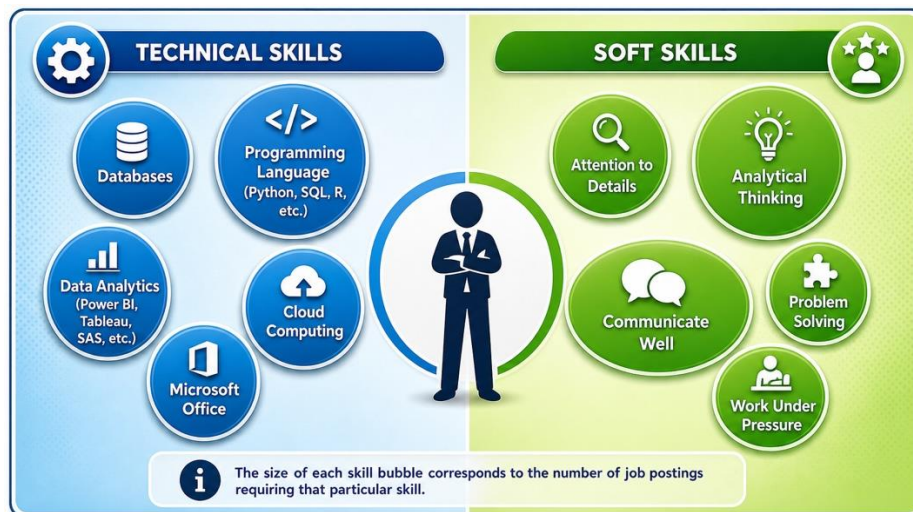
4.2 Skill Requirements and Workplace Expectations

Workforce reports and academic literature consistently identify technical competencies as foundational requirements for data analytics careers. Sources frequently emphasise programming, statistical analysis, database management, and data visualisation tools. However, soft skills such as analytical thinking, communication, and problem-solving are also highlighted as critical for translating technical outputs into organisational value. As Figure 2 shows, employers still prioritise technical skills. Nevertheless, the prominence of soft skills indicates that analytics roles increasingly require hybrid competencies. This finding supports existing literature suggesting that the modern analytics professional must combine technical proficiency with contextual and interpersonal capabilities (Almgerbi et al., 2022; Stanton et al., 2020).

Moreover, technological advancements such as artificial intelligence and big data systems have expanded skill expectations beyond traditional statistical analysis. Rather than replacing human roles, these technologies appear to elevate the complexity of required competencies, demanding adaptability and continuous learning. This reinforces arguments within prior studies that workforce readiness depends not only on technical knowledge but also on lifelong upskilling strategies.

Figure 2

Skills in demand required by employers



Sources: Ministry of Human Resources Malaysia (2020)

4.3 Professional and Structural Challenges

Despite strong demand and expanding opportunities, the analysis reveals persistent challenges that may constrain sustainable career development in data analytics. These challenges can be categorised into three interconnected areas: technical complexity, ethical considerations, and barriers to skill acquisition. Technical challenges stem from the increasing volume and heterogeneity of data, requiring professionals to manage large-scale, unstructured datasets. Ethical concerns related to privacy, bias, and responsible data governance further complicate analytics practice, particularly in sensitive sectors such as healthcare and finance. Additionally, analytics' interdisciplinary nature creates a steep learning curve for newcomers, especially when employers expect both technical expertise and industry-specific experience. These findings extend prior research by demonstrating that demand growth alone does not guarantee workforce readiness. Instead, sustainable career development depends on coordinated efforts between educational institutions, industry stakeholders, and individuals to bridge technical, ethical, and experiential gaps. The results indicate that data analytics careers are characterised by strong demand, evolving skill expectations, and interconnected professional challenges. While market expansion suggests promising opportunities, increasingly complex technological systems and employer expectations may intensify barriers to entry. The findings contribute to existing literature by integrating career growth trends, skill requirements, and workforce challenges within a single analytical framework. This integrated perspective addresses the fragmentation identified in prior studies and highlights the importance of curriculum–industry alignment and continuous professional development in sustaining analytics career pathways.

5. Conclusions

This study examined current trends, prospects, and challenges in data analytics careers through a structured secondary data analysis. The findings confirm sustained global and national demand for data analytics professionals, driven by rapid technological advancements and increasing organisational reliance on data-driven decision-making. Workforce evidence indicates that opportunities exist across multiple experience levels, although employer expectations increasingly favour candidates with both advanced technical competencies and strong soft skills. The analysis further reveals that career sustainability in data analytics is shaped by evolving skill requirements, technological complexity, and interconnected professional challenges. While technical expertise in programming, statistical analysis and data management remains fundamental, the growing emphasis on communication, problem-solving and domain knowledge reflects a shift toward hybrid competency profiles. At the same time, technical data constraints, ethical concerns and barriers to skill acquisition present structural challenges that may limit workforce readiness if not addressed systematically.

More broadly, the findings underscore the strategic importance of aligning educational curricula, industry expectations, and national digital transformation initiatives to support sustainable workforce development. Educational institutions should continuously update analytics curricula to incorporate emerging technologies and applied industry exposure. Employers should invest in structured training and mentorship programmes to bridge practical experience gaps. Policymakers may support this ecosystem through coordinated digital skills initiatives and workforce development frameworks that encourage lifelong learning. Although this study provides integrated insights into analytics career development, it is limited by its reliance on secondary data sources and aggregated job-posting evidence. Future research

may incorporate primary data collection methods, such as surveys or interviews with analytics professionals and employers, to provide deeper empirical validation and contextual understanding. Overall, this study contributes to the growing literature on data analytics workforce development by synthesising career trends, skill requirements, and professional challenges within a unified analytical framework. By highlighting both opportunities and structural constraints, the study offers practical guidance for individuals, educators, industry stakeholders and policymakers seeking to strengthen sustainable career pathways in the data analytics profession.

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Declaration of Competing Interests

The authors declare no conflicts of interest.

CRedit Authorship Contribution Statement

Almira Damia Syahnizam: Conceptualization; Methodology; Verification; Writing- draft
 Noryanti Muhammad: Conceptualization; Funding acquisition; Data Curation; Supervision; Writing-revise & review
 Mazlina Abdul Majid: Investigation; Data Curation; Writing-revise & review; Supervision
 Noor Akma Abu Bakar: Analysis; Visualisation; Writing-revise & review; Supervision

Availability of Data and Materials

The data supporting this study's findings are available on request from the corresponding author.

Ethics Declarations

This study did not involve human participants or animals. Ethical approval was therefore not required.

Generative Artificial Intelligence Declarations

The authors claim that artificially intelligent-assisted technologies, such as generative AI, were not used to generate content, ideas, or theories. We have just utilised AI to enhance readability and refine the language. This was used with extreme human control and oversight. The authors take full responsibility for reviewing and approving the content.

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