A SYSTEMATIC REVIEW OF DIGITAL MARKETPLACES AND CERTIFIED DIGITAL PROFILES FOR BLUE-COLLAR LABOUR IN THE BUILDING SERVICES SECTOR

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Abstract. The study presents a systematic review of digital marketplaces and certified digital profiles for blue-collar labour in the building services sector, spanning literature from 1995 to 2025. The review synthesises 89 peer-reviewed articles to examine how digital platforms facilitate labour matching, skill verification, and trust-building. The findings indicate that digital marketplaces improve efficiency, transparency, and worker visibility, particularly in informal employment contexts where information asymmetry limits labour mobility and professional growth. Certified digital profiles, including blockchain-based credentials, smart cards, and verified institutional records, enhance employer confidence by providing portable and authenticated evidence of skills and experience. These mechanisms reduce hiring risks and strengthen market signaling. The review further identifies key determinants influencing platform adoption, including usability, accessibility, mobile-first design, social acceptance, and regulatory compliance. The content analysis further reveals thematic clusters: digital marketplace dynamics, skills development, certification systems, sector-specific workforce digitization, and digital governance. While core functions such as credential verification and job matching are widely implemented, advanced functions, including skills tracking, culturally adaptive interfaces, and worker empowerment tools, remain unevenly developed. Overall, the study highlights the transformative potential of integrated digital profiles to bridge gaps between skilled workers and employers, contributing to workforce formalisation and improved labour market efficiency in the building services sector.

Keywords. *Blue-Collar Labour, Building Services Sector, Certified Digital Profiles, Digital Marketplaces, Skill Verification*

1. Introduction

The concept of digital transformation is multidisciplinary to increase the efficiency, transparency, and organisational impact of workforce management (Akter et al., 2023). It entails building decentralised and user-centred ecosystems by resolving such technical rationale, data security, and human capital verification (Barua & Rahman, 2023; Renom et al., 2022). This study integrates the body of work on industry platforms with the Framework of Digital Adoption to provide a holistic view of networked markets and the rise of the gig economy and delineate the difference between internal and external platform models to assist enterprises in dealing with innovation, disruption and competition. (Gawer & Cusumano, 2013). The last several decades have seen considerable activities to popularise digital labour and the gig economy all over the world (International Labour Organisation, 2021). Nonetheless, the professionalisation of blue-collar labour via these platforms is still an issue under discussion and has yet to be resolved (Kalleberg and Dunn, 2016). Information asymmetries are also still a critical issue in the labour market, and they differ in occupations and industries (Rosenblat and Stark, 2016). As an example, the building services industry has been typified by a low-skill, bad-job trap whereby, due to inadequate signaling systems, skilled workers cannot differentiate themselves from the unskilled (Snower, 1996). It is against this context that this research is concerned with digital marketplaces and qualified digital profiles of blue-collar labour in the building services industry. Although digital marketplaces address the issue of information asymmetry, their functionality is inherently associated with the underlying vocational

https://doi.org/10.31705/ICFMF2026.16

ecosystem. Within the framework of Technical and Vocational Education and Training (TVET), studies indicate that there has always been a lack of meaningful employer involvement in the curriculum design process, leading to a mismatch between institutional training and market demands (Paudel et al., 2025). This would imply that to be considered fully certified as a digital profile, platforms would have to go further than merely verifying a user and instead have feedback loops that optimize worker skills to align with real-world industry demands (Paudel et al., 2025).

The building services industry covers key technical infrastructure services, including MEP work (Prabhashwara et al., 2022), classified under AEC (Azhar, 2011). Complex construction systems generate skills shortages, quality deficiencies, and competency verification gaps, with poor recruitment management threatening project performance and safety (Gann and Salter, 2000). Blue-collar workers in developing regions face precarious employment and limited access to digital identities (Benavides et al., 2022; Fujishiro, 2019). These employees are usually faced with various professional issues, such as wage insecurity, absence of formal credit to previous learning (RPL), and non-inclusion in the digital financial system (Thathsararani and Jianguo, 2022). The rates of digital exclusion are higher in such countries as Sri Lanka, where blue-collar workers tend to be missing the so-called portable qualifications that are required to access higher value markets (Dundar et al., 2014). Empirical evidence shows that weak linkages between technical and vocational training and labour market needs leave many blue-collar labourers unable to translate their qualifications into stable employment roles (Caves et al., 2021). Despite the development of initiatives such as SkillLink or Worky, there is little and scattered scientific research on the efficiency of blockchain-based certification or digital marketplace in the building services industry. Systematic Literature Review (SLR) is suitable to synthesise and critically examine evidence in a rigorous, replicable manner (Shukla, 2024). This study follows the PRISMA 2020 framework to address the limited number of high-quality reviews on the adoption of digital labour platforms and credential verification in the building services industry, providing insights for theory and practice. It seeks to develop a systematic overview of the digital marketplace and certified digital profiles processes. To achieve this, the study is guided by three primary objectives:

- To review the purpose of digital marketplaces for blue-collar workers.
- To review the impact of certified digital profiles on skill verification and trust.
- To explore Usability, Accessibility, and Adoption Factors of Blue-Collar Digital Labour Platforms

The following section is on the research methodology, which was applied to address the research objectives.

2. Research Methodology

2.1 MATERIAL COLLECTION

This review used three databases—Google Scholar, ScienceDirect, and JSTOR—selected for their broad coverage of social science, technology, and management literature on digital labour markets. Scopus and Web of Science were excluded due to access limitations and content overlap. A consistent search string, using hierarchical keywords and Boolean operators (AND, OR), was adapted to each database's interface (e.g., title,

abstract, keywords, or full text). Duplicate records were removed based on author, title, and publication year prior to screening

("Digital labour marketplace" OR "online job platform*" OR "digital platform") AND ("blue-collar worker*s" OR "skilled worker*s" OR "construction labour*") AND ("digital profile" OR "certified credential" OR "skill verification").

The wildcard was the asterisk (") to capture the variation of the keywords and therefore capture all the relevant studies. The search date was limited to the period of 1995 - 2025, which indicates the timeframe of extensive research on the topic of digital labour platforms and certified digital credentials. Clear inclusion and exclusion criteria were defined before screening. Studies were included if they: (1) were peer-reviewed or credible reports; (2) in English; (3) focused on digital labour platforms, certified profiles, or workforce digitisation; and (4) published between 1995–2025. Studies were excluded if they were duplicates, irrelevant to employment contexts, or unavailable in full text. Criteria were applied during title/abstract screening and full-text review, resulting in 89 included studies. Following an extensive review, there were 89 articles that were found to fit the inclusion criterion and were included to perform the systematic review. As highlighted by Schwandt (1996), quality screening was used to evaluate the relevance of the articles to the topic, research methodology, findings, and contribution to knowledge.

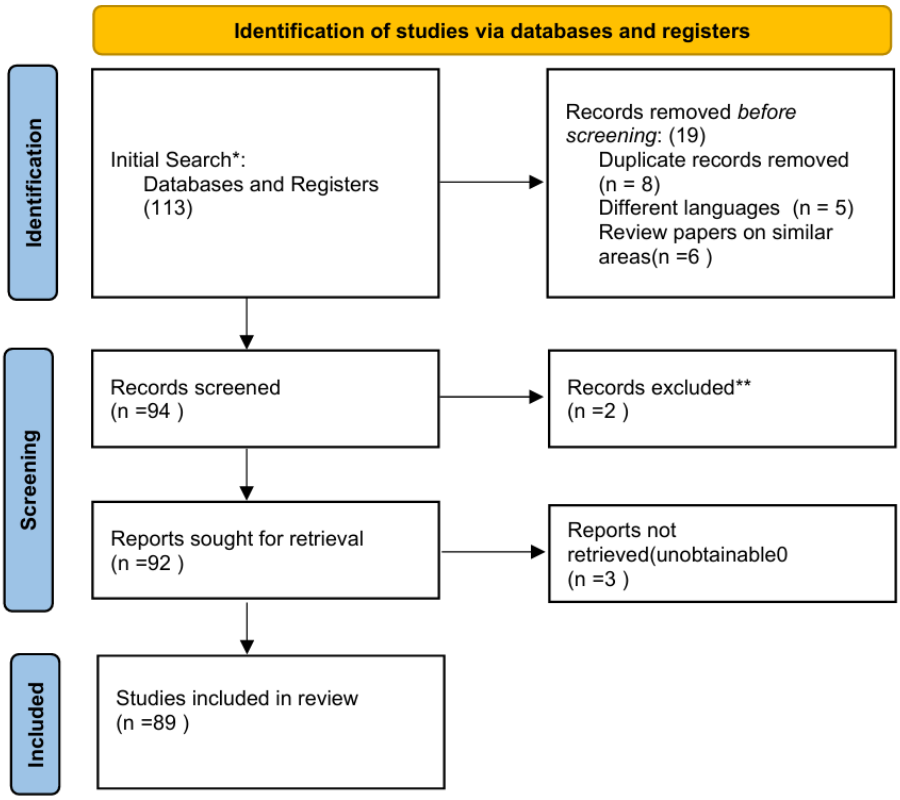


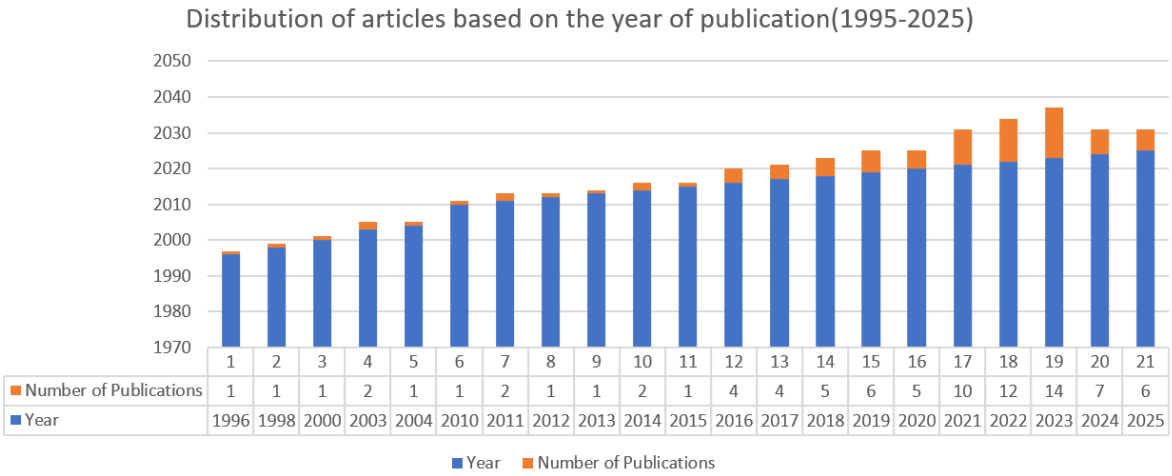
Figure 1: The methodological process followed from the PRIZMA 2020 model

The PRISMA 2020 flow diagram shows that an initial search across 113 databases and registers yielded 113 records, of which 19 were removed before screening due to duplication, language differences, or overlap in topics. After screening 94 records, two were excluded, and three reports could not be retrieved,

leaving a total of 89 studies included in the final systematic review. This process illustrates a structured and transparent selection approach, ensuring that only relevant and accessible studies were considered for analysis. Descriptive and content analyses were conducted on the selected 89 articles, following the methodological approach adopted from Ali et al. (2017). For bibliometric analysis, records from the 89 articles were exported (BibTeX from Google Scholar; RIS from ScienceDirect and JSTOR), merged, and deduplicated. The dataset was then analysed in VOSviewer (v1.6.20). Applying a minimum co-occurrence threshold of three yielded 66 keywords for the network shown in Figure 4.

3. RESULTS OF THE DESCRIPTIVE ANALYSIS

3.1 PUBLICATION PER YEAR



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Number of Publications	1	1	1	2	1	1	2	1	1	2	1	4	4	5	6	5	10	12	14	7	6
Year	1996	1998	2000	2003	2004	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025

Figure 2: Distribution of articles based on the year of publication

Figure 2 illustrates the distribution of publications between 1996 and 2025. From 1996 to 2015, the amount of research produced was low and irregular, with some years having few or no publications. Publication activity began to rise steadily in 2016 and reached double-digit levels by 2021. It peaked in 2023 (14 articles), then in 2022 (12 articles). Although there are presently six publications for 2025, this number is based on data from only a portion of the year. Overall, the increasing tendency suggests that scholarly interest in digital labour platforms and certification systems has grown recently on a global scale.

3.2 GEOGRAPHIC DISTRIBUTION OF PUBLICATIONS

3.2.1 PUBLICATION PER COUNTRY

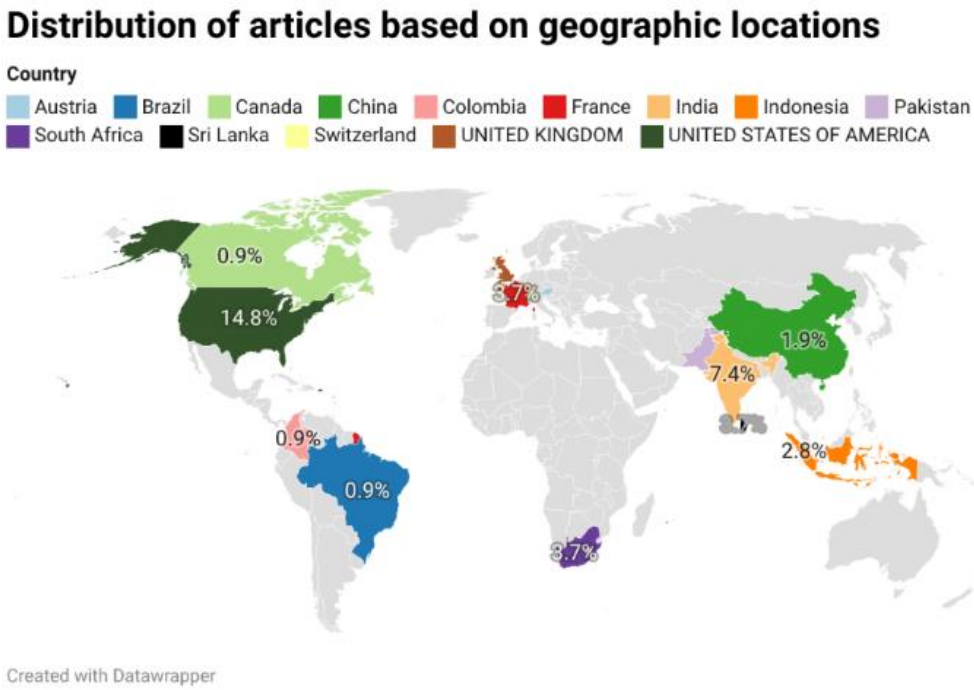


Figure 3: Distribution of articles based on geographic locations

Figure 3 presents the geographical distribution of publications using percentage-based colour coding. The United States leads with 14.8% of total publications, followed by India at 7.4%. Moderate contributions are observed from France, South Africa, and the United Kingdom (3.7% each), while Indonesia (2.8%) and China (1.9%) represent emerging engagement in the Asia Pacific region. Canada, Brazil, and Colombia each contribute 0.9%, indicating broader but relatively limited participation across the Americas. Overall, the findings reflect growing global scholarly interest, with research concentrated in a few leading countries.

3.3 KEY-WORD ANALYSIS

The 89 articles yielded a total of 66 keywords with the help of the VOS viewer software. These keywords were selected because they were present in at least three publications. The occurrence of a keyword within a document indicates the broadness of the word, whereas co-occurrence shows the frequency of occurrence of two keywords together in a title, abstract, or keyword list. The Results of the present research are illustrated in Figure 4 with the help of a minimum of four keywords. The figure demonstrates the frequency of co-occurring terms in the publications by the size of the nodes. The strength of relationships is reflected in the thickness of the linking lines. The distance between the nodes in the figure indicates a strong association between the nodes. According to the visual network map (refer Figure 4), the following keywords can be divided into five clusters.

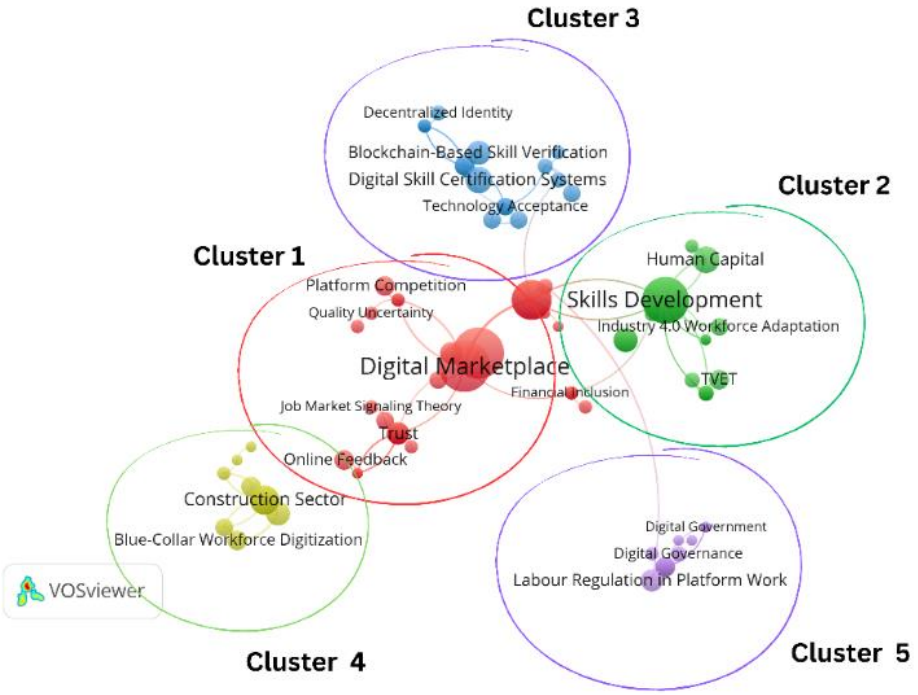


Figure 4: Co-occurrence of keywords in literature

` As illustrated in Figure 5, the VOS viewer network visualization identifies four major thematic clusters within the digital labour and skills ecosystem of platform-based economies. These groups are colour-coded and are the research themes closely related to each other.

Cluster 1 (red) is the Digital Marketplace and Platform Trust Ecosystem. This is the most central and interconnected theme. It focuses on platform dynamics, trust mechanisms, and market signaling within the context of digital labor. The major words in this cluster are digital marketplace, trust, online feedback, job market signaling theory, platform competition, quality uncertainty, financial inclusion, and skills. The cluster deals with the problem of reputation systems, credibility, platform competition, and systems that decrease information asymmetry between platforms and clients. It also cuts across both governance and skills themes, which means that marketplaces have become the key to digital labour structures.

Cluster 2 (green) shows Skills Development and Workforce Adaptation. This cluster emphasises long-term human capital formation in the context of Industry 4.0. The keywords to be mentioned are skills development, human capital, Industry 4.0, workforce adaptation, and Technical and Vocational Education and Training. It focuses on upskilling, vocational education, and training systems that equip workers to work in the digital and platform-based jobs. It examines how education systems and training institutions react to the change in

technology and the labour market changes. This cluster is a representation of structural and institutional reactions to digitalization.

Cluster 3 (blue) relates to Digital Skill Certification and Blockchain Verification Systems. It focuses on technology-based processes of credentials and skills verification. Some of the representative terms are blockchain-based skill verification, digital skill certification systems, decentralised identity, and technology acceptance. This cluster lays emphasis on decentralised and safe credentialing models that aim at enhancing trust and transparency in digital labour markets. It also explores the adoption of new verification solutions by the users. The cluster is closely related to the theme of the digital marketplace and skills development, noting the value of credible certification in the realm of platform economies.

Cluster 4 (Light Green) is Construction Sector and Blue-Collar Workforce digitisation. The keywords included in this cluster are the construction industry and the digitisation of the blue-collar labour force. It represents industry-specific research on the integration of digital labour platforms and skills systems by traditional industries, especially construction. Most attention is paid to practical workforce changes, the integration of informal labour, and the adaptation of manual or semi-skilled workers to the digital system.

Cluster 5 (Blue) is concerned with Digital Governance and Labour Regulation on Platform Work. This group consists of digital government, digital governance, and the regulation of platform work. It touches on the issue of policy, regulatory frameworks, and institutional mechanisms of oversight of digital platforms. It is focused on the balance between innovation and the protection of workers, labour rights, and the intervention of government policy.

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Figure 5: Word cloud

The word cloud is a visual representation of the frequency and the salience of the key terms related to digital labour markets, platforms, and workforce management. The words like *"Markets", "Platform", "Digital", "Job", and "Government"* indicate the great focus on the structural and institutional features of digital labour ecosystems. The highlight of the words "Digital" and "Platform" shows the central role of technology-mediated work environments, while "Job" emphasises the employment outcomes embedded within these systems. The secondary terms, including *"Skills", "Training", "Education", "Certification", "Verification", and "Readiness*", signify the importance of human capital development and the role of credentials in workforce participation and employability. Technological enablers such as "Blockchain", "BIM", "Mobile", and "Internet" reflect digital tools that support market transparency and trust. Terms such as "Informal", "Freelancing", and "Gig" acknowledge diverse work relationships and the need to integrate informal work into formal structures.

4. RESULTS OF THE CONTENT ANALYSIS

In the subsequent step, the selected articles were examined, synthesized, and organized into thematic categories derived from the cluster structure and aligned with objectives. The analysis focused on identifying underlying structural drivers of digital labour market transformation, the technological mechanisms enabling trust and verification, and the institutional responses shaping skills development and governance. The following sections provide a descriptive discussion of each category.

4.1 PURPOSE OF ONLINE MARKETS AMONG BLUE-COLLAR LABOURERS

The housekeeping and facility management sectors in Sri Lanka are heavily reliant on skilled blue-collar labour, specifically across disciplines such as plumbing, electrical installation, carpentry, painting, masonry, and HVAC maintenance (Wickramasinghe & Gamage, 2021). Informal labourers often have limited access to formal labour protections, steady incomes, and opportunities to move into formal employment due to the unregulated nature of informal work arrangements (Slonimczyk, 2022). The fragmentation strengthens the asymmetry of information between employers and workers and limits labour mobility. Digital marketplaces are now developed worldwide to institutionalise labour exchange and lower transaction costs, and increase transparency (Woodcock and Graham, 2020). These platforms enhance efficiency and the visibility of workers through the capability to search skills profile, real-time job postings, verified degrees, and built-in payment systems (Oranburg and Palagashvili, 2021). Digital platforms may support portable and verifiable records of skills across the project and employer in construction and building services. There are three types of online labour platforms, namely: Business-to-Consumer (B2C), Business-to-Business (B2B), and peer-to-peer (P2P) models (Kaessi and Lehdonvirta, 2018; Woodcock and Graham, 2020). B2C platforms involve matching the tradespersons with the households, whereas B2B platforms are used to match the contractors to certified workers when working on bigger projects. P2P models facilitate decentralised cooperation between the workers. These typologies broaden the way of accessing employment in addition to enhancing efficiency and market visibility.

4.2 IMPACT OF CERTIFIED DIGITAL PROFILE ON SKILL VERIFICATION AND TRUST

Information asymmetry in labour markets reduces employer trust and increases hiring risk, particularly where skill validation mechanisms are weak (Spence, 1973). Certified digital profiles help to solve this problem by incorporating validated credentials, institutional data and work histories into secure digital identities (Gefen et al., 2003).

Digital credentialing systems enable workers to save and provide validated data regarding skills and accomplishments in the form of digital badges, verifiable credentials, and blockchain-protected documents. It has been found that blockchain-based credentials have the potential to minimize fraud, speed up the verification process by offering cryptographically verifiable records that an employer can consult without intermediaries, enhancing the efficiency of hiring and professional mobility (Herbke et al., 2024; Verifiable Credentials are based on decentralized identifiers which make it possible to perform real-time verification and reduce the use of manual checks, which are systemic inefficiencies of the legacy credentialing (Herbke et el., 2024). The immutability and decentralization of blockchain raise the credential data integrity levels, reducing chances of corrupting or mostly altering data (Minchev et al., 2025). Literature on micro-credentialing proposes equally that transparent records of credentials promote higher levels of confidence and cross-institutional mobility, thereby facilitating the labour market mobility and international mobility of credentials (Jušica et al., 2025). In addition to credential issuance and verification, open badge technologies and smart badge technologies implemented on digital platforms promote trust because learners can show authenticated results of attained skills directly to employers (Kontzinos et al., 2024). Peer validation and decentralized recordkeeping are trust mechanisms that supplement credential verification by decreasing perceived risk in an online labour market and increasing platform credibility (Minchev et al., 2025). Secure blockchain infrastructures also contribute to transparent audit trails at governance levels and harness credentialing system alignment with data protection and ethical concerns, which is essential in protecting personal information and facilitating wide interoperability (Jušić et al., 2025).

4.3 USABILITY, ACCESSIBILITY AND ADOPTION FACTORS OF BLUE-COLLAR DIGITAL LABOUR PLATFORMS

The studies on the adoption of technology in the low-skill working environments emphasise that the success of platforms depends on the factors influencing acceptance by users and the simplicity of their design and inclusion. Studies indicate that interfaces that are poorly designed are actual obstacles, and the workers with low levels of digital literacy tend to be reluctant to proceed because of complexity or the fear of making a mistake and reduce their readiness to utilise online services (Azem et al., 2025). The Unified Theory of Acceptance and Use of Technology (UTAUT) provides an evidence-based prism, which includes performance expectancy, effort expectancy (perceived ease of use), social influence, and facilitating conditions as the most effective factors of behavioural intentions and actual use of digital systems, such as mobile-based work features (Venkatesh et al., 2003; Suzianti et al., 2024). Empirical studies that use UTAUT on blue-collar job-searching websites demonstrate that the expectancy of effort and social influence are key predictors of intention to use such technology, whereas facilitating conditions and perceived usefulness to adoption also affect the behaviour of use, demonstrating the need of favourable circumstances and practical usefulness of such technology (Suzianti et al., 2024). Low-bandwidth optimisation, offline operation, and design of a multilingual interface can be used to increase accessibility, especially in low resource and developing situations (Donner, 2008; Heeks, 2002; Evers, 2001). The summary of key platform factors that support digital work and their coverage in previous studies is presented in Table 1. As shown, factors such as verified worker profiles, job matching algorithms, and rating systems are widely discussed across the literature, highlighting the importance of trust, efficiency, and accountability in digital labour platforms (Donner, 2008; Heeks, 2002; Evers, 2001). Other factors, including digital payments, user-friendly interfaces,

and social adoption mechanisms, appear less consistently but remain critical for improving accessibility, financial transparency, and cultural acceptability. This synthesis provides a comprehensive overview of design and operational elements that influence platform effectiveness.

Table 1, Key platform factors support digital work

Platform Factors	A	B	C	D	E	F	G	H	I	J	K
Verified worker profiles / credential checks	X	X	X	X	X	X	X			X	
Job matching & recommendation algorithms	X	X	X	X		X	X		X	X	X
Rating & review systems	X	X	X	X	X		X			X	
Digital payments & financial transparency	X		X	X	X	X		X	X	X	
User-friendly interface / low digital literacy support	X	X		X		X		X			
Access across devices/connectivity optimization		X		X			X		X		
Data privacy & regulatory compliance	X		X	X	X			X	X		
Social/cultural adoption features	X	X			X	X	X		X		
Worker empowerment tools (skills tracking, notifications)		X	X	X		X			X	X	

A:(Azem et al., 2025), B:(Katrak and Yusifli., 2025), C:(Woodcock and Graham, 2020), D: (Levina and Arriaga ,2014), E:(Oranburg & Palagashvili, 2021), F (Pettas, 2024), G:(Ziemann, 2017), H:(Shukla, 2024), I:(Weinmann et al.,2016), J:(Kässi and Lehdonvirta, 2020), K:(Andika ,2025)

As shown in Table 1, credential verification and job matching are the most consistently implemented platform features (Azem et al., 2025; Woodcock and Graham, 2020). Rating and review systems are moderately applied, while digital payments, accessibility features, and worker empowerment tools remain unevenly distributed across platforms (Pettas, 2024; Kässi and Lehdonvirta, 2020). These findings confirm that while foundational functionality is widely adopted, more advanced and inclusive features are still situational and context dependent.

5. Discussion

This systematic review shows that digital marketplaces and certified digital profiles are crucial to changing blue-collar labour in the building services industry. As the analysis reveals, online solutions promote transparency, efficiency, and trust in the labour transactions, solving the long-standing problem of information asymmetry and skill verification. Descriptive and content analysis of the 89 studies indicate that these platforms are becoming more popular globally, but they have many differences in terms of their functionality, features, and how they are adopted in different geographic, institutional, and socio-economic settings (Ali et al., 2017). Online marketplaces present

numerous employment frameworks, comprising B2C, B2B and P2P markets, which provide visibility, labour matching, and availability of workers with varied skills. By integrating certified digital profiles, which frequently utilize blockchain and smart credentialing systems, the employer and worker gain more trust, as employers can get verified evidence of skills and experience, education, and previous work experience. This is consistent with the larger body of research on the topic of digital labour markets, where portable, verifiable skills are noted to play a crucial role in alleviating the problem of quality uncertainty and enhancing labour mobility (Tapscott and Tapscott, 2018). The review also brings out the fact that the adoption and effective use of the platform is not only limited to technological ability, but also to the usability, accessibility, as well as social acceptance. The mobile-first design, the support of various languages, offline access, and simplified interfaces are the features that will be necessary to make sure that blue-collar workers with low digital literacy will effectively use the systems (Venkatesh et al., 2003).

6. Conclusion and Recommendation

This paper offers a systematic overview of digital marketplaces and certified digital profiles in the building services industry. The findings establish that these platforms enhance transparency, trust, and verifying skills of blue-collar workers in a situation where informal work and a lack of formal credentials are standard. The certified digital profiles minimize information asymmetry, enhance labour mobility, and give credible signals to the employers, and digital platforms facilitate real-time job matching and visibility of workers and integration into institutions. Governments and regulators should establish clear policies to ensure compliance with labour regulations, data protection, and ethical governance. Fourth, an increase in adoption, digital literacy, and worker engagement should be facilitated by creating training programs and raising awareness. Overall, digital labour markets help reduce information asymmetry, lower transaction costs, and support the formalisation of fragmented labour markets through structured job matching and skill verification. Certified digital profiles further enhance trust through validated credentials and reputation systems. However, effective adoption depends on usability, accessibility, and worker empowerment. Therefore, combining secure verification mechanisms with an inclusive and user-friendly platform design is essential for long-term effectiveness. Future research should examine the long-term impact of these platforms on labour market efficiency, professionalism, and socio-economic inclusion, particularly in emerging economies with high levels of informal employment. Theoretically, this review advances literature on information asymmetry, platform economics, and digital labour governance by framing blockchain credentials and reputation systems as trust-building mechanisms in informal labour markets. Practically, it offers guidance for platform designers to prioritise inclusive, mobile-first interfaces; for governments to strengthen data protection and labour regulations; and for training institutions to align vocational curricula with digital credentialing systems.

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