

## Transforming Retail Payments in Nepal: A Bibliometric Analysis of the QR Code Payment System

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### Abstract

**Purpose:** This study analyzes the intellectual structure of scholarly literature on QR code payment systems and their impact on retail payments in Nepal, focusing on adoption drivers, barriers, and emerging research trends.

**Methodology/Design/Approach:** The study employs a narrative literature review and bibliometric analysis of academic publications, citations, and collaboration patterns from 2015 to 2024. Data were drawn from major databases such as Scopus, Dimensions, and Web of Science to examine global and local research developments.

**Findings:** The findings indicate a significant rise in research interest after 2020, largely driven by the COVID-19 pandemic and the increased adoption of contactless payment systems. Key determinants of QR code payment adoption include low transaction costs, ease of use, and enhanced security. The literature also highlights financial inclusion as a dominant theme, particularly for unbanked and underbanked populations. However, challenges such as cybersecurity risks, low digital literacy, and limited interoperability among applications persist.

**Implications:** The study emphasizes the need to strengthen digital literacy, improve cybersecurity frameworks, and enhance system interoperability. Policymakers and financial institutions should also consider integrating blockchain and AI technologies to improve transparency and security while promoting inclusive digital payment ecosystems in Nepal.

**Originality/Value:** This research provides a comprehensive synthesis of QR code payment literature and offers insights for researchers, policymakers, and practitioners involved in digital payment system development.

**Keywords:** Bibliometric analysis, digital finance, financial inclusion, QR code, retail payment

**JEL Classification:** G20, G23, L86, O33

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## Introduction

The digital payments ecosystem has rapidly since the advent of QR Code payment systems. It has, also allowed merchants to deliver cashless payments from restaurants, supermarkets, taxis to government services. QR code payments have grown even faster thanks to the COVID-19 crisis as it served as an important driver for the government to achieve its goal of digitizing financial services, and the legislation that followed as a consequence of COVID has reinforced cashless alternatives. QR Code payment systems have also been fueled by expanding internet access in many nations, increase smart phone subscriptions, and availability of mobile payment applications or wallets. Thus, the continuing progress and uptake of financial technology (Fin-tech) and the increasingly notable combat the world is having with cash despite the growing acceptance of cashless payments, while simultaneously taking the world down a path towards financial inclusion.

In the past, it was only possible to pay for goods or services in cash. Now it will be much easier for everyone because you do not need to reach down in to your pocket or purse to take out the cash before payment. Traditional payment methods are moving towards QR code payments which are easy, and can be considered contactless, easier to complete and safer compared to the traditional payment methods.

As the internet and mobile devices have advanced there have been positive changes, QR code payments are seen as much more acceptable and likely to be used particularly in developing countries like Nepal, especially with many fin-tech options available easier, cashless payment systems can be made much easier.

Nevertheless, it is apparent that QR code payment places democratize the accessibility of the digital economy for small business owners, including vendors, and marginalized populations by globalizing us to elaborate on why equalization of inclusion is an important condition. Nevertheless, because QR payment platforms or 'cashless payments' in developing economies like Nepal, are not only dependent on the sizing of the market, trust, civic digital competences, and the enabling infrastructural access. As evidenced through this commentary about QR code payment platforms, we are clear that QR code payments have transcended the border of payments convenience and security functionalities as they are tackling financial exclusion. It is also clear that these have become a low priority for developing countries due to virtual absence of civic understanding of digital coins, underwhelming management of cyber security, and lack of procedure in place in Nepal. Therefore, undoubtedly these issues will shape the landscape of how QR code payment platforms will be developed.

The aim of this study is to ascertain the complete picture of QR code payment systems, adoption, and retail payments in Nepal. It aims to evaluate overall patterns of publication and contribution both internationally and locally and conduct a landscape analysis of the existing studies addressing QR code payment systems and will trace new research avenues between 2015 - 2024. The bibliometric analyses will contribute to understanding the structure of knowledge around QR code payment system research, the nature of gaps in barriers in the structure of knowledge, and future directions of research. This would provide an understanding of how QR code payment systems, can potentially increase financial inclusion, address cyber security issues, and build better digital financial systems in Nepal, by drawing a picture of the academic landscape. Therefore, this contribution will markedly improve the concept of QR payment systems. The rest of the paper is organized as follows - section 2 is a literature review of QR code payment systems, section 3 represents a conceptual model, section 4 is methodology, section 5 is findings and data analysis, section 6 is a general discussion

and section 7 is conclusion and recommendations for further research. QR Code payment is simple, consumer driven, process which involves scanning a machine readable code with a mobile app that is linked to the user's digital wallet, or bank account. This has enabled transacting, and opened possibilities for small business to begin to explore digital payment options. There are still barriers to adopting a QR code payment system, including the lack of digital literacy, cyber security concerns, and interoperability issues across different platforms.

The purpose of this research is to analyze studying QR code payment literature in the last few years, and through a bibliometric analysis, visualize the literature in this new domain, the research trends, and the emerging research gaps. Upon determining the trends and gaps in QR code payments research spur the analysis should look into the potential impacts for retail through QR code payments, especially in developing economies like Nepal.

## **Literature Review**

Extensive literature exists on QR code payment systems, examining various aspects of their adoption, performance, and implications.

### ***Adoption Factors***

Various research studies have identified factors that impact QR code payment adoption decisions as ease of use, convenience and trust. Zhang & Wang (2020) stated that the perceived easy-of-use factor is the most important influence towards user's intention to pay or use QR code payment. Similarly, Gupta & Arora (2022) aim to study the aspects of transaction speed and security in relation to user satisfaction.

### ***Financial Inclusion***

QR code-based payment systems" are called trojan horses, as they facilitate the financial inclusion of small and micro businesses and create an opportunity for the underbanked to participate in the digital economy (Hassan et al, 2023). Chawla & Joshi (2021) contribute to the discussion regarding the financial inclusion provided through the use of QR codes for payments as QR code payment solutions provide MSEs (Micro and small Enterprises) with an affordable digital payment option.

### ***Security and Trust***

In order for QR code payments to become widely accepted, trust has to be established. If users viewed QR code payments as a secure and reliable platform, then QR code payments would achieve greater levels of acceptance. Ryu (2018) believes if users perceived QR code payments as secure and reliable platform then QR code payments would gain greater levels of acceptance. Cybersecurity attacks (for example, unauthorized transactions, and breaches of data) are the primary barrier to QR code payments gaining widespread acceptance (Singh & Verma, 2020).

## *Technological Infrastructure*

The third fundamental issue related to QR code payments rate of adoption is interoperability of credit systems, one with another. Gupta & Arora (2022) suggested that users would appreciate the experience of using those payments even more if they were in a frictionless experience where their digital wallets and banking applications were talking to each other in a seamless way.

## *Conceptual Model*

The conceptual framework of this study is based on three key dimensions:

**Table 1**

### *Conceptual Model*

<b>Dimension</b>	<b>Key Factors</b>	<b>Impact on Adoption</b>
Technological Factors	Ease of Use, Security, Interoperability	Direct Impact on Adoption
Consumer Behavior	Trust, Digital Literacy, Perceived Usefulness	Moderating Impact
Regulatory Environment	Government Policies, Financial Inclusion Initiatives, Cyber security	Indirect Support

## **Research Methods**

The bibliometric analysis was conducted in a structured and systematic manner using reputable academic databases, including Scopus, Dimensions, and Web of Science, covering the period from 2015 to 2024. The study focused on key keywords such as “QR code payment,” “digital finance,” “financial inclusion,” and “customer satisfaction” to retrieve relevant literature. Advanced bibliometric tools, including VOSviewer and Biblioshiny, were employed for data analysis and visualization. The process involved careful data extraction, cleaning, and mapping to ensure accuracy and consistency in the dataset. Subsequently, publication trends, citation patterns, and research collaboration networks were systematically analyzed and visualized to identify intellectual structures and thematic developments in the field. Ethical considerations were duly observed by appropriately acknowledging all data sources and ensuring transparency in the analytical process.

## Findings

**Table 2**

*Publication Trends, Key Contributors, and Thematic Insights (2015–2024)*

Category	Description	Key Insights
Publication Trends	Number of publications 2015-2024	of Significant rise post-2020 due to COVID-19 from pandemic and increased adoption of digital payment systems
Key Authors	Top contributing authors	Zhang Y., Singh A., and Gupta P.
Collaborative Networks	Co-authorship patterns	High collaboration between financial institutions and technology providers
Keyword occurrence	Co- Most frequent keywords	Financial inclusion, digital literacy, cybersecurity
Citation Impact	Highly cited publications	cited Ryu (2018), Zhang & Wang (2020), Hassan et al. (2023)

## Discussion

The discussion section provides a more detailed consideration "on the bibliometric findings" and the larger ramifications of QR Code Payment System, particularly for the retail payments system in Nepal. As QR Code Payment Systems are increasingly adopted in Nepal the transaction approaches of consumers and businesses have shifted from slow processes to ease of use and high speed security of payments. This section discusses the potential to formally recognize the financial inclusion aspects that QR Code payments provide, recognize the representations of stake holders in coming together to promote/motivate up-take of QR code payment, and discuss the factors that inhibit some of the current barriers to main streaming QR payments.

### *Financial Inclusion Enhancement*

QR code payment solutions are mostly recognized for improving financial inclusion. In Nepal, with the high volume of unbanked or under banked people, QR code payment systems are a relatively fast and inexpensive access point into digital finance. With QR payment platforms like eSewa, Khalti and FonePay, we can also see that QR code payment systems allow small businesses or micro-entrepreneurs the opportunity to accept digital payments without the burden of a point-of-sale system. QR code payment services have also allowed marginalized populations to conduct formal transactions and even access future financial services.

In addition, QR Code Payment Systems are providing financial inclusion for women, especially in the case of women entrepreneurs in rural settings. They are simple payment solutions, allowing women to integrate into the digital economy without complicating their budgeting and accounting needs. Overall, however, despite the promising developments of QR code payment systems, implementation in a mass scale is hindered by digital illiteracy, which is the case in many parts of rural Nepal.

### ***Role of Key Stakeholders***

Key stakeholders such as market actors, financial service providers, technology input providers, and regulatory bodies have worked together cohesively to ensure that QR Payment is successfully adopted in Nepal. Many financial service providers are working with many Fintechs to ensure seamless digital payment options. The regulatory bodies have enacted policies and standards to encourage cash-less transactions. The biggest key stakeholder is the Nepal Rastra Bank (NRB), which has provided guidelines and some regulations as they move in the direction of digital payments.

Technology providers are providing user friendly mobile applications and securing the payment gateways. QR Code integration with digital wallets such as eSewa and Khalti has improved the utilization rate of digital payments. However, there are too many players in this space as well as the disjointed digital payment architecture pose challenges for interoperability and standardization.

### ***Cybersecurity and Trust Issues***

QR code payment systems will face issues surrounding cybersecurity and user trust, despite the number of benefits offered. Many users still argue they won't use these systems because of unauthorized transactions, data breaches, software attacks, phishing attacks etc. Ryu (2018) in his research into the adoption of digital payment systems suggested that it is necessary to identify a security risk to prompt the adoption of a digital payment system. So, it is important to think about, that before there is positive users trust, their needs to be ensured security controls are put in place, for example fraud detection systems.

The use of Blockchain technology along with AI fraud detection systems can help in exploring an innovative solution for the cyber security issues associated with QR security and payments. Again, these tools are also newly adopted in Nepal so it remains to be seen how they can be effective in securing payments.

### ***Interoperability Challenges***

The interoperability challenge around different QR code payment platforms is clearly a significant impediment to seamless transaction flow between service providers. The consumer experience is undeniably harder and presumably more duplicate experience each time they have to engage with different digital wallets, at the same merchant location, which is likely not scalable. What's worse, there are QR code formats that are wildly different, as all service providers have their defined (open) QR code that works particularly with their defined wallet.

The interoperability challenges surrounding QR code payments could be a way to afford standards for QR codes that make cross-transaction platforms easier to implement but we may want to consider if interoperability challenges could be better supported by national payments gateways, which could provide greater interoperability and ease of use in a shared digital payments ecosystem.

### ***Digital Literacy and Awareness***

Digital illiteracy among consumers particularly in rural or under-served communities will also be a significant barrier for QR code payment systems to develop in a systemic way. Many of these potential users will not have the capacity or knowledge to engage with mobile payment applications and will not take that leap into the digital payment space. Financial institutions together with government and non-governing organizations will need to work together to build deliver various forms of digital

literacy initiatives and financial education initiatives in certain remote communities to remove that barrier.

Working in partnership to consumers who are learning about using a digital payment system can help the financial institutions, government, and non-delegated organizations provide useful digital literacy education in an equitable manner. Digital literacy solutions should be flat on the user being empowered to learn about payments forms, how they are used and secured / benefits of digital payments, and how to use mobile payment applications.

### ***Future Prospects and Recommendations***

Low levels of digital literacy for consumers, including the stakeholders who were in rural and underserved communities, is still a big barrier to mainstream QR payment solutions. There are surely existing users who just belong to a group that has no comprehension whatsoever of mobile payment applications, but also do not see them as an alternative to other modalities. So further, it is also important that the digital literacy campaigns and financial literacy campaigns and awareness campaigns make the links between possibility and actual use.

The combination of a financial institution with partners from the commercial sector, and partners from public authorities, as well as NGOs, could be a good avenue for providing digital literacy programming in far removed communities that have very low digital literacy. Digital literacy programs could emphasize awareness of the benefits of digital payments, and proper guidance and advice around security, and ensure that using mobile payment applications is made to be as normal, and intuitive, and simple as possible.

The future of QR code payment systems looks bright for improving financial inclusion in Nepal, and also in improving the retail payment systems. The following recommendations could be made for the expansion of QR code payment systems:

- **Security:** It will be equally important to create robust security systems and tools to deal with risks in cyber security for example multi-factor authentication systems and AI driven fraud detection systems.
- **Access to digital literacy programs:** For QR code payment systems to develop a user base, it will require a start at the national level on digital literacy programs aimed at consumers and specifically rural consumers.
- **Standardization of QR Code:** In order to ensure interoperability of the various applications, it will be important to develop a set of standards for QR code specifications.
- **Financial inclusion:** There is opportunity for partnerships on QR code payment systems with micro finance institutions and NGOs to reach unbanked populations with QR code payment products.
- **Adoption of block chain technology:** It might be worthwhile considering whether the potential can be unleashed using block chain payment systems to provide credibility and open relationships.

In respect to this, QR code payment systems can also be utilized to build a safe and integrated eco-system in Nepal for financial transactions. Apart from that, cyber-attacks are another critical issue with respect to cyber security. Regulatory mechanisms can be improved and block chain security added to mitigate risk and promote user trust. There is no compatibility between various e-wallets in Nepal because of which transactional convenience is not being provided, as there must be a common payment system.

## Conclusion and Implications

Nepal's QR Code Payment Systems have disrupted the retail payment market space as payment systems as a strong and easy-to-use alternative payment channel to cash. As a first, the paper establishes the relevance of QR Code Payment Systems in the nexus of financial inclusion and low socio-economic groups' and small business owners' needs. This bibliometric analysis confirms that the agents of consumer uptake of QR code payment system based on consumer usage of convenience - ease of transaction, quick transaction, safety, and trustworthiness. Even with potential, greater adoption of QR Code payment systems and pre-paid schemes and value added services still remains subject to challenges by continuing concerns relating to cyber security threats, know-how deficits, architectural lack of additional precedent, and interoperability lack.

Banks, tech firms, and regulators have taken the lead in promoting QR code payment adoption. Stakeholders, through collaboration, have strived to create secure digital payment platforms and introduced regulatory conditions to close the gap effectively for cashless payment users. Refining the present dispersed digital payment ecosystem to one solid state where all platforms utilize interoperability is a priority. There will also be a nationwide adoption of a payment gateway and a single QR code for QR code system payments to promote payment efficiencies and inclusiveness in Nepal. Cyber security issues have been a major setback to the adoption of QR code payment systems because customers feared data leaks, fraud transactions, misuse of devices, etc.

Strong security systems, i.e., multi-factor authenticating systems, fraud detection systems on the basis of AI, and block chain technologies being deployed would also raise the overall security level and boost the confidence of the users. Apart from that, digital literacy is also one of the key problems for the users of rural communities and economically backward society segments.

Consumer classes of mass-media money literacy and money literacy in new media need to be financed in order that the consumer market would be trained and equipped with necessary knowledge and training to operate adequately with Q.R. code paying systems. One of the most fascinating fields of research in the next few years would be the testing and use of implementing other emerging technologies like Biometric Authentication, Blockchain, Artificial intelligence, in an attempt to improve the security and efficiency and ultimately the transparency of Q.R. code transactions. Further, longitudinal studies must be carried out to examine the adoption rate of Q.R. track payments and evaluate their long-term impacts on economic empowerment, consumer conduct, and financial inclusion. An examination of the impact of digital literacy programs, regulatory policies, and cross-platform interoperability will give even better insights to policymakers, banking institutions, and technology firms.

Future research will have to explore cross-border Q.R. code payment schemes that would be used for transactions during the process of remittance flow, thereby corroborating the above statement.

Last but not least, the future impact of Q.R. code payment usage will be analyzed so that policy recommendations can be offered to enable their greater usage by business organizations. There has to be a strong digital financial system if they are going to work and networks are going to gain the trust that they would otherwise require.

By overcoming the hurdles and capitalizing on the opportunities, QR code payment systems can become a game-changer in making an inclusive, secure, and efficient digital financial ecosystem in Nepal. Banks, regulators, and technology providers would have to work together actively for it to happen. This study provides an extensive

backdrop for ensuring easy understanding of today's schema of QR code payment schemes and developing back stoppers to appropriate subsequent studies and designs toward exploiting adoption in the best form possible through the use of QR code payment schemes. There must be re-facement and reframing of the retail payments as well as money inclusion of Nepal through QR code payment schemes. Security concerns, digital divide and interoperability should not distract QR code payment systems from complete rollout. Future research directions include uncovering new approaches for hybridizing blockchain and artificial intelligence to strengthen security mechanisms, investigating how digital literacy campaigns influence adoption rates of QR-based payment systems, and designing regulatory frameworks that promote interoperability across financial service providers. In addition, longitudinal studies are needed to examine the long-term effects of QR code payment systems on financial inclusion in Nepal. Addressing these issues can play a central role in building a more inclusive, efficient, and secure digital financial ecosystem in the country.

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### **Conflict of Interest**

The Authors declare that there is no conflict of interest.

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