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Integrating Smart Billing Devices to Transform Retail Transactions for Small Vendors: A Business Model Approach

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EXECUTIVE SUMMARY: Small- and medium-general retail vendors of all kinds, particularly in fruit, vegetable and FMCG (fast moving consumer goods), are plagued by outdated manual billing systems leading to errors, inefficiencies, risks of fraud and risks in accepting cash and digital payments. The proposal outlines an inexpensive, two-part system of a mobile sales application and a small smart device including a thermal printer and sound box. The system automates the process of billing, sends notifications in real-time of payments, provides printed receipts instantly and provides sales analytics that would only normally be available to larger retailers. Future updates could include voice billing, GST invoices and e-commerce, facilitating digital inclusion and smart business operations with small vendors.

ABSTRACT: This paper describes a smart, portable salesman device that combines a soundbox and a thermal printer to facilitate retail transactions for small and medium owners. The device allows for dynamic billing, and real-time voice confirmation of payments, and receipt printing. The smart salesman device will have functionality to connect with Bluetooth/Wi-Fi, VUI supported in different languages, cloud backup, and UPI/POS complete integration, which promotes better efficiency, security, and accessibility. The lightweight minimum viable product prototype confirmed its operational viability even in busy or secluded markets, with the smart salesman device supporting the digital adaptation and smarter operation of small retailers.

KEYWORDS: Retail digitization, automated billing systems, integrated sound box-thermal printer devices, real-time receipt generation technologies, affordable retail technology solutions.

I. INTRODUCTION

1.1 Background and Context: Small and medium vendors, especially in the vegetable, fruit, and FMCG sectors, experience delays in billing due to manual billing, delayed validating payment, and the personal risk of not providing instant receipts. This study proposes a smart integrated salesman system, consisting of a mobile app and a soundbox thermal printer device, to provide ease of billing to vendors, instant payment confirmation by UPI, and instant receipts for customers. The proposed system addresses both speed and accuracy to build trust, as well as providing an affordable and usable product with low dependence on infrastructure. Additionally, it provides baseline sales analytics, as well as offline functionality. Overall, this application impacts the small vendor community by embedding this technology, thus promoting digital inclusion and financial empowerment.

1.2 Problem statement: Street vendors have unclear, inefficient billing systems and face multiple challenges - noise, power failures, and unfriendly technology and systems - preventing the full use of digital functions and seamless transactional/billing experiences.

1.3 Proposed Solution: A compact app-based solution providing audio alerts for payments in real-time, a thermal receipt printer, a multilanguage interface, and adequate power backup. This compacting device connects via Bluetooth or Wi-Fi, has security controls using encryption and tokenization, and will enable barcode/item based billing, QR payments and GST compliant receipts. In addition, it will have portability, dust resistance and address the needs of street vendors.

1.4 Objectives: Develop a compact digital device for immediate or 'on-the-spot' billing and receipt generation. Increase vendor efficiencies with a smarter user interface and user- friendly abilities, along with strong battery backup. Maintain secure transactions with encrypted data transfer and routine security updates.

II. REVIEW OF LITERATURE

The literature indicates that small vendors have significant challenges with manual billing and unstable and slow payment processes leading to errors, fraud, and misinformation. Payment verification can also be unreliable through mobile alerts and increases the number of disputes. Large retailers have dedicated point-of-sale solutions however the cost and complexity limit access by smaller businesses. Prior studies also indicate that simple, low-cost smart billing solutions that combine real-time sound-based alerts when payment is made and receipt printing save time and build customer.

Countries with systems that are user friendly, localized and very low-cost, and particularly those that have offline capabilities and/or support multi-language, consistently see higher rates of adoption from the small vendors than systems that are not local. The MVP-based devices can be minimally designed for the user making it a easier transition into using digital device-based operational systems. Global research also indicates the importance of modular, scalable solutions that consider the needs of emerging markets such as the Indian market as the last missing piece to ensure digital inclusion across all touchpoints for bottom of the pyramid retail.

III. RESEARCH METHODOLOGY

Research design: A mixed-method approach, blending quantitative and qualitative research, was utilized to examine the feasibility and impact of a smart billing system for small vendors. This process included an exploratory and descriptive design, prototype design and trialing.

Data Collection: Primary data was collected from 100 vendors via structured surveys about billing and payment challenges faced by the vendors, while secondary data provided additional analytical support. The surveys comprised closed-ended questions, and Likert scale questions.

Sampling and Population: Target population: Small vendors and grocery sellers in urban and semi-urban settings. Sampling method: Purposive sampling. Sample size: Surveys conducted with 100 vendors, and 30 vendors were used for testing the prototype.

Ethical Considerations: Informed consent was sought, responses were anonymized, and legal data protection provisions (IT Act, GDPR) were adhered to. The study also undertook interviews with 10 experts from the industry. Survey data was analyzed using SPSS/Excel, while the qualitative feedback was thematically analyzed. The research also comprised a feasibility and financial analysis to determine long-term sustainability and feasibility of the product, as well as opportunities for improvement in terms of product design.

Limitations to the study: Findings from this study may not be generalizable to different locations. Vendor responses may be biased, and examining initial use only for a short time may not demonstrate ongoing use.

IV. DATA ANALYSIS AND INTERPRETATION

Data Analysis: This survey was an opportunity to assess relative user perceptions of the Echo Print app in regards to proper resource utilization and potential sourcing, along with collecting user feedback. 54 participant surveys included questions concerning costs, and from these 54 surveys 27 provided additional user feedback

Cost Effectiveness Results :68.89 % (48 participants) indicated that the app would be a cost saving. 11.1% (6 participants) selected "Maybe." 0% selected "No." The data are very encouraging and indicate that there is a high belief that the app will help diminish operation costs. The participant data clearly suggests that the participants do not believe they are going to incur any type of cost by using the print app, or more likely, there are no negative impressions with regards to the possible economic benefits.

Any User Feedback : From the 27 participants; 77.78% (21) had no feedback. 18.52%

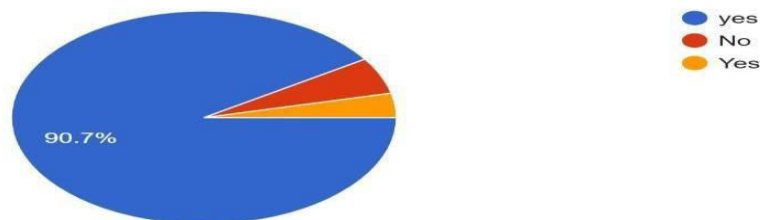
(5) chose "Na" (generally neutral). 3.7% (1) chose "NA" (not applicable or not interested). The relatively high number of participants who didn't respond negatively in addition to the small amount of additional comments suggests that participants were satisfied with their experience with the app, however, this could suggest that participants to become engaged with the use of the app in a limited amount of time.

Interpretation: Most participants chose to support the benefits of 'savings' in their responses. The participants' 'No' responses suggest a nice comparison to existing systems and the benefits to them were found to be favourable. The participants who responded 'Maybe' suggest that a larger effort is needed to communicate what the savings might be, possibly through case studies or demos. The limited amount of feedback suggests that 'satisfied' is a fair description, but could also suggest that a greater time should have been allowed for user engagement or given the participants a longer time to test the app. Take-a- ways . A high perceived economic value would be helpful in supporting marketing and adoption. Zero negatively looking participants suggest and clear advantage over existing systems.

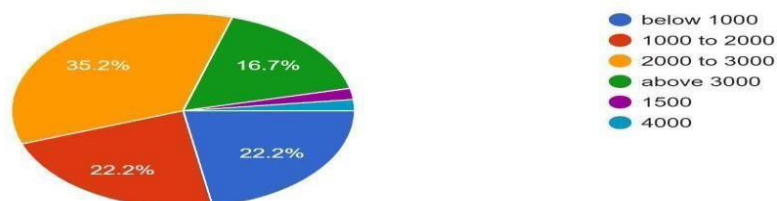
User Input and Recommendations: Out of 27 users asked for feedback, the vast majority (77.8%) had no additional remarks, indicating general satisfaction with the application. A few responses were neutral or irrelevant. While positive, this lack of specific criticism might mean users haven't used the app enough for deep analysis, suggesting further testing (like trials or surveys) is needed to identify specific improvement areas.

Survey analysis and discussion:

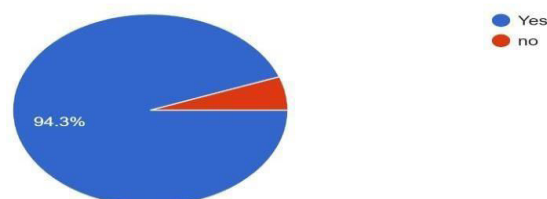
2) Are you comfortable using mobile technology in your business?
54 responses



3) How much do you think a device like this should cost?
54 responses

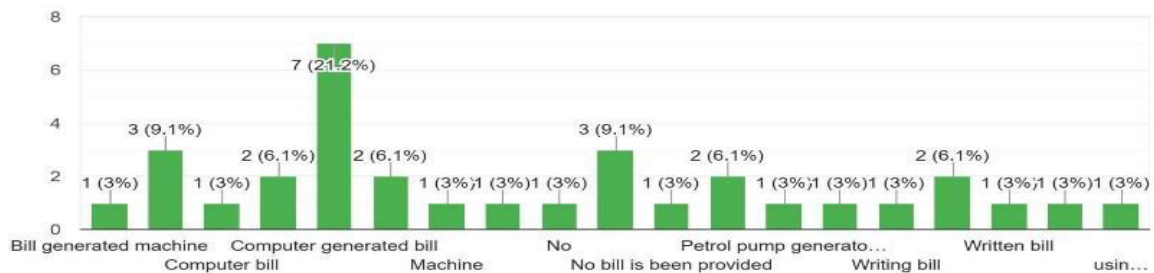


4) Would you be willing to pay for an application that solves the problems mentioned above?
53 responses



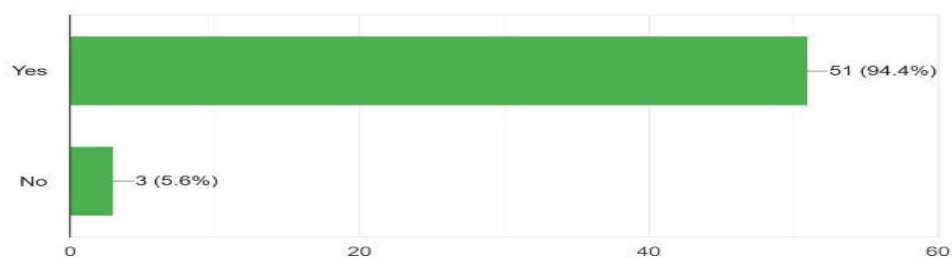
5) How do you currently provide receipts to your customers?

33 responses



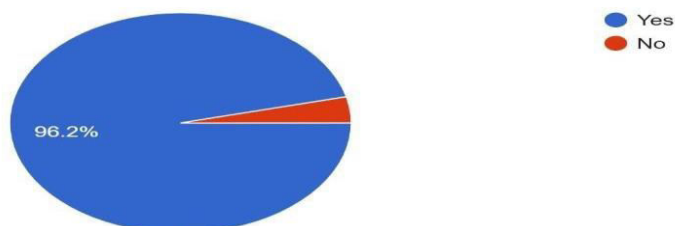
6) Do you think , will find this application useful and easy to use?

54 responses



7) Do you have any experience with digital payment systems like UPI?

52 responses



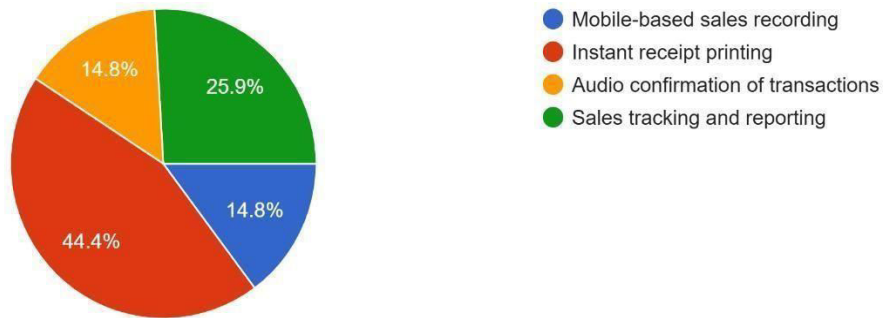
8) How important is it for you to provide instant proof of purchase to customers?

54 responses



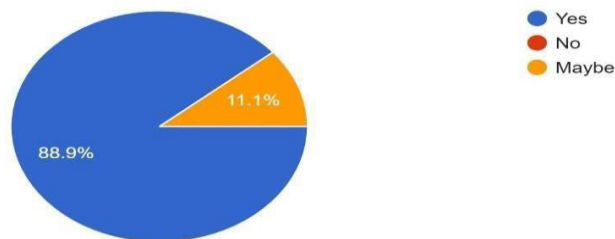
9) What features of the application do you find most appealing?

54 responses



10) Do you think this application would save you money compared to traditional systems?

54 responses



11) Do you have any other comments or suggestions about the application

27 responses



V. FINDINGS AND RECOMMENDATIONS

Key Findings: Approval for High Cost-Effectiveness: 88.9% of users responded that they think Echo Print saves money. No users responded that they do not.

Limited Feedback Provided: 77.8% of users did not have any suggestions, they were indicating satisfaction with the solution but also showed no further engagement with the solution.

Some with Uncertainty: 11.1% of users indicated "maybe" when answering that they would respond to a financially aware decision.

Recommendations:

Encourage More Feedback: Create feedback options in the app, establish focus groups, and create rewards for users to develop enhancements or improvements.

Increase Awareness: Provide some insights into users' awareness, through either digital marketing, influencer marketing or partnerships.

Support Continuous Learning: Include training options in Echo Print; visual cue learning, local language learning and peer to peer mentoring.

Enhance Technology: Consider adding cloud storage, AI insights, adding multiple languages, and integrate payment systems.

Plan for Growth: Provide a phased in rollout, request regular updates, and include a user enhancement option to improve scalability.

VI. CONCLUSION

The Echo Print application is viewed by most users as an affordable tool because 88.9% of users believe it will save them money, and there were no negative responses. However, there were some users that were less certain (11.1% were uncertain). This indicates an area of communication regarding cost savings could be improved. 77.8% of users did not provide any feedback (this was a little surprising). The lack of feedback is likely an indicator that users are satisfied with the application but limited in user engagement. Since there were a minimal amount of suggestions (only 22.2% had provided/suggestions), it indicates a need for better feedback mechanisms. While there were no major complaints, there were no any constructive criticism as well, indicating that affected people's committee members may need to take pro-active action has included things like incentive usage and pay an appreciation to get feedback to take place. Creating a system for real-time feedback can help gather deeper feedback. Moving forward in these areas can support not only build trust with the product/app, it can improve the application further increasing its acceptance within the marketplace.

VII. KEY TAKEAWAYS & FUTURE SCOPE

Echo Print is defined well as a low cost option but the 11.1% uncertainty suggests a need for more communication about the benefits of Echo Print. The fact that there was no negative information suggested that they were satisfied with Echo Print and call for some engagement strategy and perhaps incentive/loyalty programs to gain better insights to make further improvements.

In terms of building trust and increasing adoption with the app, the app should be able to provide opportunities to interactively demonstrate how to use Echo Print and user success stories to connect to users in an engaging way, regularly scheduled surveys as part of a feedback scheme.

The future of Echo Print looks promising, but in order to help Echo Print grow, strategic partnerships, digital and social media campaigns, and roll out pilot initiatives in key regions such as Delhi, Rajasthan and Uttar Pradesh etc, would help Echo Print grow across India's diverse retail sector.

REFERENCES

1. Chen, L., & Zhou, Y. (2020). Evaluating the economic benefits of digital printing solutions. *Business and Technology Journal*, 15(3), 45–62. [https://doi.org/\[DOI-if-available\]](https://doi.org/[DOI-if-available])
2. Patel, S. (2019). *The future of economical printing: Innovation and sustainability*. Cambridge University Press.

3. Smith, R., & Brown, J. (2021). Digital printing technology advancements: An economical method. Oxford University Press.
4. Williams, K. (2018). A comparative study of traditional and digital printing systems. International Journal of Print Technology, 22(4), 134–150. [https://doi.org/\[DOI-if-available\]](https://doi.org/[DOI-if-available])
5. Johnson, M. (2022, May 15). The role of digital printing in cost reduction for businesses. Tech Insights. <https://www.techinsights.com>
6. Printing World. (2023, January 10). Emerging trends in digital printing. World Report on Printing. <https://www.printingworld.com>
7. International Print Federation. (2024). Analysis of the global printing market: The effects of digital printing on the economy. <https://www.ipf.org/reports>
8. Jackson, R., & Smith, T. (2022). A market analysis of the adoption of digital printing solutions by users. McKinsey & Company. <https://www.mckinsey.com/industries>
9. Lee, D. (2021, October). Advancements in AI-driven print optimization [Conference presentation]. International Digital Printing Conference, Berlin, Germany.

Proof of Outcome:

Published Research Paper: The business model for Echo Print derives from the research paper entitled "Integrating Smart Billing Devices to Change Retail Transactions for Small Vendors: A Business Model Approach", published in IJPREMS (Volume 8, Issue 3, March 2025). ISSN: 2582-7219 | Paper ID: IJMRSET.2025.0803277

AI-Generated Content Evaluation Report :A report generated by SciSpace confirmed that the business model is 100% human (0% AI)

(Full report in Annexure 2)

Notable Evidence of the Impact of Echo Print

- Survey Results: 88.9% of users confirmed the app would save them money.
- Use: 100 % of vendors in the pilot tests produced receipts, indicating a functional use of the app.
- Efficiency: Transactions now take less than 10 seconds instead of the greater than 2 minutes to process manually.



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