

Utilizing Internet of Things (IOT)-based Design for Consumer Loyalty: A Digital System Integration

Zaenal Aripin^{1*}, Vip Paramarta¹, Kosasih¹

¹Master of Accounting Postgraduate Program, Sangga Buana University Bandung, Indonesia.

Received: June 28, 2023

Revised: September 3, 2023

Accepted: October 25, 2023

Published: October 31, 2023

Corresponding Author:

Zaenal Aripin

zaenal.arifin@usbypkp.ac.id

DOI: [10.29303/jppipa.v9i10.4490](https://doi.org/10.29303/jppipa.v9i10.4490)

©2023 The Authors. This open access article is distributed under a (CC-BY License)



Abstract: The purpose of this research is to describe the design of a digital system to create IOT-based customer loyalty. The application of IOT systems for the banking sector is inevitable as part of the widespread positive impact of communication and information technology. The method used in this research is to use literature review by reading a lot of previous research which is the basis for this research by reading a lot of research, the author will be able to better understand the ongoing research by reading a lot of books and journals of previous research, new problems will be found and can be used as future research. The result of this research is a proposed system that can be used as a reference for further research, and can be used as an applied system so that the existing system can be further developed and can be even better, the proposed system produces the latest system using IoT and is expected to produce a smart consumer loyalty system.

Keywords: Consumer; Digital System; Integration; IOT; Loyal

Introduction

Internet of think (IoT) is a media that is used in various systems with the use of internet media (Dhar et al., 2022; Mishra & Tyagi, 2022), all data will be sent in real-time or directly and on time, with the use of internet media, everything can be monitored remotely, the use of internet media on smart consumer loyalty systems will be very helpful in supervision and enforcement by consumers, banks, authorities/police and government parties to create consumer comfort and security of a financial institution (Hui et al., 2021; Putra, 2019; Yu, 2021).

The smart loyalty system is a system used in consumer services that is connected by a medium, namely the internet (Ali et al., 2015; Choi et al., 2021), by connecting transportation with the internet, data from all consumer loyalty systems can be monitored remotely. In other words, in this system there will be interactions between consumers, IOT, smartphones, banking data bases, OJK, Police, Insurance and the goal of a system that is Satisfied, Safe, and Loyal consumers.

In today's digital era, customers have greater access to banking information and options. They have a wide

choice to choose a bank that suits their needs (Raza et al., 2020). Therefore, banks must developed unique and attractive service innovations for customer, so as to increasing the value of the customer experience and influence their decision to remain loyal to the bank (Sun et al., 2020).

The customer's decisions to remain loyal to the bank greatly affects the bank's business continuity (Hawkins & Hoon, 2019). In the increasingly fielder competition, retaining existing customer is more efficient than finding new customer (Mayer et al., 2020; Strich et al., 2021). Theretofore, banks needed to understand the factors that influence customer decisions to remain loyal, including the role of bank service innovation in shaping customer perceptions and preferences (Purnama et al., 2021).

Method

The methods used in this research can be explained narratively and graphically (Yamaji et al., 2023) as described below. The explanation of the research method is carried out in a certain order according to the

How to Cite:

Aripin, Z., Paramarta, V., & Kosasih. (2023). Utilizing Internet of Things (IOT)-based Design for Consumer Loyalty: A Digital System Integration. *Jurnal Penelitian Pendidikan IPA*, 9(10), 8650-8655. <https://doi.org/10.29303/jppipa.v9i10.4490>

logic flow of the researcher in translating reality into something that is a proposed solution.

Analysis of the actual situation and literature

In the first stage of the research method using actual and factual situation analysis, as well as considerations based on literature. In this case, it will be possible to find the latest problems on the research topic raised this time, with the literature review method it will get something knowledge that can add insight for researchers (Purnama et al., 2021).

Problem Identification

In this second stage by finding a problem, the problem raised in this research is how to implement a smart consumer loyalty system with the IoT method and internet media, with this problem a smart system proposal will be created (Nižetić et al., 2020).

Proposed IoT Architecture

In this last section, the author conducts research based on data that has been collected through previous research studies, and researchers conduct research so that the reset can produce data and the data can be a proposal for a new system, which will be used in the future by conducting research. Then the problem raised can be solved and a solution can be found (Putra et al., 2020).

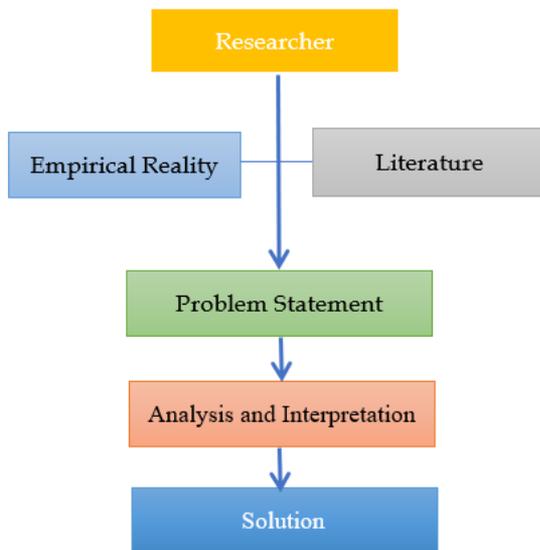


Figure 1. Research Method Flow

This research uses qualitative methods (Lee, 2020) by reading previous research, by exploring journals that conduct similar research and reading many books that discuss research like this, qualitative methods by also conducting discussions with various parties who understand this research.

Result and Discussion

In the results and discussion section, it will be discussed how this system is proposed and built, with pictures and explanations it is expected to clarify the proposed system that has been made. With pictures and explanations it is hoped that it will clarify the proposed system that has been made, therefore the proposed system will be explained as follows.

IoT and Accelssibility Ease of Used

The internet of things in this system is a medium that connects the vehicle, and the system in the police database. with the connection between the vehicle and the database, the supervision and prosecution of the police will be easier and the vehicle can be monitored remotely. the police will be easier and vehicles can be monitored remotely.

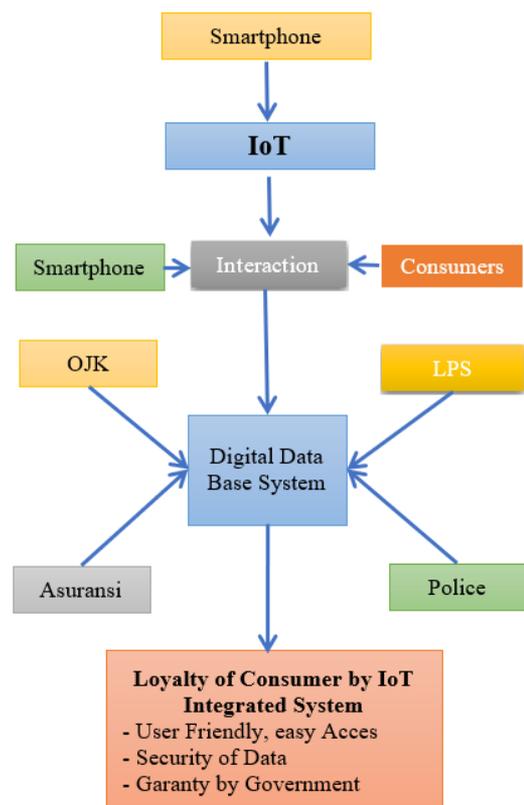


Figure 2. Design Of Consumer Loyalty Based IoT

Mobile banks, such as mobile banking apps, mobile online banking, and intelligent ATMs, provide convenience and speed for customers to conduct banking transactions (Jebarajakirthy & Shankar, 2021). Customers can access bank services anytime and anywhere, without having to physically visit a branch office. The use of these technologies provides political added value to customers, reduces barriers in

transacting with banks, and improves efficiency in managing their finances.

Technology development continues, and banks are starting to use more sophisticated technologies to increase added value. For example, biological relations such as fingerprints or facial prints for automated transactions can enhance security and add value. The use of artificial intelligence technology in processing customer data can also improve analysis and decision-making, providing high efficiency and better streamlining for customers (Bharadiya, 2022; Yau et al., 2021). Technological developments continue, and banks no longer need to use technological innovations to enhance experience value (Grewal et al., 2020). For example, biological relations such as fingerprints or facial prints for automated transactions can enhance security and add value (Obaidat et al., 2019). The use of artificial intelligence technology in processing customer data can also improve analysis and decision-making, providing high efficiency and better streamlining for customers.

A system that successfully integrates multiple channels and platforms can provide a broader and more harmonized solution for customers. Customers can initiate intelligence through online channels, follow mobile banking applications, and conduct transactions through online channels, such as online banking services or through ATM machines. The golden integration belt across all customers' channels should have integrated connected and experience, so that they can easily execute their activities without having to start from scratch.

The internet of things in this system is a medium that connects consumers, and the system in the Police database (Blythe & Johnson, 2021; Chopra et al., 2019). With the connection between the vehicle and the database, the supervision and prosecution of the police will be easier and the vehicle can be monitored remotely. By connecting the customer and the internet (Greengard, 2021), the customer by smartphone will be able to interact with the banking and other institution, it is hoped that by interacting with the driver, the car will be able to provide advice if something unwanted happens (Munirathinam, 2020). The customer will be able to provide advice if something unwanted happens, and is expected to interact with others by providing information that occurs around it, for example a crime (Nicholls, 2020).

System Data Base

The use of the internet, the data will be sent to the database of the Police who use the Cloud system. With this database, it can be connected by authorized parties such as the police, fire department and the police, OJK, insurance, with the connection of these parties then, if

something happens to the vehicle, it will be handled immediately, for example, an incident or criminal action.

IoT helps remotely connect and control CCTV cameras, smart alarm systems, vehicle telematics, and other monitoring technologies to ensure security of property and equipment (offices, ATMs, CIT vehicles, etc.) and send alerts in case of malicious activity (Badshah et al., 2019). IoT is also a driver of cybersecurity: wearable devices enable user authentication through fingerprints, retina scans, and face ID when customers make payments through mobile apps (Liang et al., 2020). Fraud detection. IoT coupled with AI-powered analytics helps identify fraud and hacker attacks by collecting and analyzing user account data. If suspicious activity is detected, users can be notified immediately, and their accounts - temporarily disabled. One-touch payment. Thanks to the integration of banking IoT solutions and wearables, users can make payments without using a credit or debit card directly. NFC-powered devices, such as smartphones and smartwatches, enable contactless payments for seamless financial transactions.

IoT offers a wide range of digitization benefits ranging from 360-degree customer views to enhanced financial security, fraud detection, advanced strategic insurance, and more. IoT-enabled advancements help banking and finance meet their clients' expectations and offer a better enterprise customer experience. If you want to expand your business capabilities with IoT, contact ScienceSoft: our experienced know how to make IoT work for you.

Insurance used of IoT. IoT devices monitor the state of insured objects and notify insurers of any abnormalities so that they can intervene and take appropriate measures to mitigate risks (Arumugam & Bhargavi, 2019). Insurers also utilize IoT-generated data to take a preventive approach and predict incidents. For example, insurers can detect asset failures and warn policyholders before damage occurs. This approach helps reduce the number of insurance claims as well as prevent insurance fraud. A more specific case above is usage-based insurance which is being actively adopted by car insurance providers around the world.

The combination of IoT and telematics (GPS tracking, in-car car diagnostics) helps insurance companies collect data on vehicle conditions and driver behavior to provide personalized insurance packages. For example, Progressive, a car insurance company, launched a telematics-based car insurance program called Snapshot. Telematics devices transmit personalized driving data to insurance providers, and safe driving behavior is rewarded with lower insurance rates.

Another interesting example is the analytics-focused Cold Cover by Parsyl Inc., a cargo insurance

suite for perishable goods that uses IoT sensors and data analytics to track shipments in real time, monitor temperature fluctuations in containers, assess risk, and send alarms in the event of temperature violations and spoilage at any point in the supply chain. With visibility and advanced analytics, Parsyl can investigate claims and make payments to shippers within 72 hours.

IoT-enabled communication from client payment systems and CPA software ensures fast and secure data exchange and facilitates automation of routine bookkeeping processes such as data entry, reconciliation, billing, etc. With IoT, accountants can track financial data in real-time and gain accurate insights into company operations to better perform advisory functions (Chu & Yong, 2021). IoT also makes a difference in audits by increasing transparency and automation: CPAs can monitor transactions and control audit trails on the fly to quickly reveal data inconsistencies and prevent fraud.

Conclusion

The use of internet media or IoT is the right media that can be used in intelligent transportation systems. intelligent transportation system, with internet media, data will be sent directly for up to date data, with internet media, all supervision and enforcement can be done remotely, and with internet media all systems can be controlled. The future reset is to combine the intelligent transportation system with other systems. by still using the internet media, with the internet media there will be many systems that are connected and can be monitored by one door. In closing, it can be concluded that bank service innovation has a significant role in influencing customer experience value and customer loyalty decisions. By continuously innovating and adapting relevant technologies, banks can improve service quality, provide a positive customer experience, and fulfill customer expectations and needs. Positive customer experience value through bank service innovation creates customer satisfaction, builds trust, and strengthens the emotional bond between customers and banks. Customers' decision to remain loyal is based on their perceptions of service quality, ease of use, personalization, and the bank's responsiveness to customer needs. Customer loyalty decisions are also influenced by factors such as trust and emotional ties with the bank.

Acknowledgments

The author would like to thank the parties who have played a role in this research activity so that this research can be carried out well. Thank you to the informants, and the local government for permitting researchers to complete this academic task.

Author Contributions

In this study, all researchers contributed actively to the tasks that were carried out together. In other words, this research was supported by equal distribution of roles and contributions of all authors, because each stage was always discussed together.

Funding

This research is empirical research funded by the researchers themselves or independent research. So on this happy occasion, I as the first author express my highest appreciation and gratitude to my colleagues who are members of this research team for their financial participation.

Conflicts of Interest

In this research, there is no tug of interest and or hidden interests among the researchers. In addition, this research is also not an order from any funder because it is an independent research, or in other words, the research team itself plays a role in preparing proposals, selecting topics, conceptualizing problems, collecting data, analyzing problems, drawing conclusions until the publication stage in this journal.

References

- Ali, Z. H., Ali, H. A., & Badawy, M. M. (2015). Internet of Things (IoT): definitions, challenges and recent research directions. *International Journal of Computer Applications*, 128(1), 37–47. Retrieved from <https://www.ijcaonline.org/archives/volume128/number1/22841-2015906430>
- Arumugam, S., & Bhargavi, R. (2019). A survey on driving behavior analysis in usage based insurance using big data. *Journal of Big Data*, 6, 1–21. <https://doi.org/10.1186/s40537-019-0249-5>
- Badshah, A., Ghani, A., Qureshi, M. A., & Shamshirband, S. (2019). Smart Security Framework for Educational Institutions Using Internet of Things (IoT). *Computers, Materials & Continua*, 61(1). <https://doi.org/10.32604/cmc.2019.06288>
- Bharadiya, J. P. (2022). Driving Business Growth with Artificial Intelligence and Business Intelligence. *International Journal Of Computer Science And Technology*, 6(4), 28–44. Retrieved from <http://www.ijcst.com.pk/IJCST/article/view/232>
- Blythe, J. M., & Johnson, S. D. (2021). A systematic review of crime facilitated by the consumer Internet of Things. *Security Journal*, 34, 97–125. <https://doi.org/10.1057/s41284-019-00211-8>
- Choi, W., Kim, J., Lee, S., & Park, E. (2021). Smart home and internet of things: A bibliometric study. *Journal of Cleaner Production*, 301, 126908. <https://doi.org/10.1016/j.jclepro.2021.126908>
- Chopra, K., Gupta, K., & Lambora, A. (2019). Future internet: The internet of things-a literature review.

- 2019 *International Conference on Machine Learning, Big Data, Cloud and Parallel Computing (COMITCon)*, 135–139.
- Chu, M. K., & Yong, K. O. (2021). Big data analytics for business intelligence in accounting and audit. *Open Journal of Social Sciences*, 9(9), 42–52. <https://doi.org/10.4236/jss.2021.99004>
- Dhar, S., Khare, A., & Singh, R. (2022). Advanced security model for multimedia data sharing in Internet of Things. *Transactions on Emerging Telecommunications Technologies*, e4621. <https://doi.org/10.1002/ett.4621>
- Greengard, S. (2021). *The internet of things*. MIT press.
- Grewal, D., Hulland, J., Kopalle, P. K., & Karahanna, E. (2020). The future of technology and marketing: A multidisciplinary perspective. *Journal of the Academy of Marketing Science*, 48, 1–8. <https://doi.org/10.1007/s11747-019-00711-4>
- Hawkins, D. L., & Hoon, S. (2019). The impact of customer retention strategies and the survival of small service-based businesses. *Organizations & Markets: Policies & Processes eJournal*, 1-24. <https://doi.org/10.2139/ssrn.3445173>
- Hui, C. Y., McKinstry, B., Fulton, O., Buchner, M., & Pinnock, H. (2021). Patients' and clinicians' perceived trust in internet-of-things systems to support asthma self-management: qualitative interview study. *JMIR MHealth and UHealth*, 9(7), e24127. <https://doi.org/10.2196/24127>
- Jebarajakirthy, C., & Shankar, A. (2021). Impact of online convenience on mobile banking adoption intention: A moderated mediation approach. *Journal of Retailing and Consumer Services*, 58, 102323. <https://doi.org/10.1016/j.jretconser.2020.102323>
- Lee, I. (2020). Internet of Things (IoT) cybersecurity: Literature review and IoT cyber risk management. *Future Internet*, 12(9), 157. <https://doi.org/10.3390/fi12090157>
- Liang, Y., Samtani, S., Guo, B., & Yu, Z. (2020). Behavioral biometrics for continuous authentication in the internet-of-things era: An artificial intelligence perspective. *IEEE Internet of Things Journal*, 7(9), 9128–9143. <https://doi.org/10.3390/su15075932>
- Mayer, A.-S., Strich, F., & Fiedler, M. (2020). Unintended Consequences of Introducing AI Systems for Decision Making. *MIS Quarterly Executive*, 19(4). Retrieved from <https://research.vu.nl/en/publications/unintended-consequences-of-introducing-ai-systems-for-decision-making>
- Mishra, S., & Tyagi, A. K. (2022). The role of machine learning techniques in internet of things-based cloud applications. *Artificial Intelligence-Based Internet of Things Systems*, 105–135. https://doi.org/10.1007/978-3-030-87059-1_4
- Munirathinam, S. (2020). Industry 4.0: Industrial internet of things (IIOT). In *Advances in computers*, 117(1), 129–164. <https://doi.org/10.1016/bs.adcom.2019.10.010>
- Nicholls, R. (2020). What goes on between customers? A cross-industry study of customer-to-customer interaction (CCI). *Journal of Service Theory and Practice*, 30(2), 123–147. <https://doi.org/10.1108/JSTP-05-2019-0112>
- Nižetić, S., Šolić, P., Gonzalez-De, D. L.-I., Patrono, L., & others. (2020). Internet of Things (IoT): Opportunities, issues and challenges towards a smart and sustainable future. *Journal of Cleaner Production*, 274, 122877. <https://doi.org/10.1016/j.jclepro.2020.122877>
- Obaidat, M. S., Rana, S. P., Maitra, T., Giri, D., & Dutta, S. (2019). Biometric security and internet of things (IoT). *Biometric-Based Physical and Cybersecurity Systems*, 477–509. https://doi.org/10.1007/978-3-319-98734-7_19
- Purnama, S., Sukmasari, A., & Bhandari, R. (2021). The role of religiosity as a mediating variable in the relationship between online transactions and customer satisfaction and loyalty in islamic banking. *Aptisi Transactions on Management (ATM)*, 5(2), 143–151. <https://doi.org/10.33050/atm.v5i2.1532>
- Putra, A. S. (2019). Penggabungan Wilayah Kota Bekasi Dan Kota Tangerang Ke Wilayah ibu kota DKI Jakarta Berdasarkan Undang-Undang Nomor 23 Pasal 32 Tahun 2019 Dapat Membantu Mewujudkan DKI Jakarta Menjadi Kota Pintar. *Insan Pembangunan Sistem Informasi Dan Komputer (IPSIKOM)*, 7(2). <https://doi.org/10.58217/ipsikom.v7i2.156>
- Putra, A. S., Novitasari, D., Asbari, M., Purwanto, A., Iskandar, J., Hutagalung, D., & Cahyono, Y. (2020). Examine relationship of soft skills, hard skills, innovation and performance: The mediation effect of organizational learning. *International Journal of Science and Management Studies (IJSMS)*, 3(3), 27–43. Retrieved from <https://www.ijmsjournal.org/2020/volume-3-issue-3/ijms-v3i3p104.pdf>
- Raza, A., Saeed, A., Iqbal, M. K., Saeed, U., Sadiq, I., & Faraz, N. A. (2020). Linking corporate social responsibility to customer loyalty through co-creation and customer company identification: Exploring sequential mediation mechanism. *Sustainability*, 12(6), 2525. <https://doi.org/10.3390/su12062525>
- Strich, F., Mayer, A.-S., & Fiedler, M. (2021). What do I

- do in a world of artificial intelligence? Investigating the impact of substitutive decision-making AI systems on employees' professional role identity. *Journal of the Association for Information Systems*, 22(2), 9. <https://doi.org/10.17705/1jais.00663>
- Sun, H., Rabbani, M. R., Ahmad, N., Sial, M. S., Cheng, G., Zia-Ud-Din, M., & Fu, Q. (2020). CSR, co-creation and green consumer loyalty: Are green banking initiatives important? A moderated mediation approach from an emerging economy. *Sustainability*, 12(24), 10688. <https://doi.org/10.3390/su122410688>
- Yamaji, N., Nitamizu, A., Nishimura, E., Suzuki, D., Sasayama, K., Rahman, M. O., Saito, E., Yoneoka, D., Ota, E., & others. (2023). Effectiveness of the Internet of Things for Improving Working-Aged Women's Health in High-Income Countries: Protocol for a Systematic Review and Network Meta-analysis. *JMIR Research Protocols*, 12(1), e45178. Retrieved from <https://www.researchprotocols.org/2023/1/e45178/>
- Yau, K.-L. A., Saad, N. M., & Chong, Y.-W. (2021). Artificial intelligence marketing (AIM) for enhancing customer relationships. *Applied Sciences*, 11(18), 8562. <https://doi.org/10.3390/app11188562>
- Yu, H. (2021). Application analysis of new internet multimedia technology in optimizing the ideological and political education system of college students. *Wireless Communications and Mobile Computing*, 2021, 1-12. <https://doi.org/10.1155/2021/5557343>