Internet of Things for Customer Relationship Management (CRM) Software: Opportunities and Benefits

Sevidon Wang[1], Mahmonir Bayanati[2]

[1] National United University, Taiwan;
[2] Department of Management, Islamic Azad University, West Tehran Branch, Tehran, Iran;

A R T I C L E I N F O	**A B S T R A C T**
	Customer relationship management software has many advantages for different businesses and economic enterprises. Today, the Internet has become the main tool for information exchange, business, communication, and an integral part of daily life. Internet technologies have witnessed fundamental changes in the way of interaction over a decade. With new technology, objects are also connected to the Internet and with humans; Intelligent systems and data are interacting and exchanging. The Internet of Things will increase the maturity level of customer relationships and will have a profound impact on customer relationship management. This is because the huge data of the Internet of Things contains information about the customer, and textual inputs can greatly increase the capabilities of managing relationships with customers. Therefore, the future of customer relationship management will be provided by cognitive computing, big data analysis, and creating deep knowledge in organizations. In this paper, the vital features and opportunities, and benefits of CRM systems based on the Internet of Things have been examined.

1. Introduction

A list of businesses, customer information, and the history of the company's communication with them are recorded in the CRM software. In fact, the local CRM software is used to manage the daily operations of sales units and after-sales services (Fallah et al., 2021). But the world of CRM is rapidly changing and soon Internet of Things technology can be used to collect customer information and record and analyze them in CRM software. The ability to identify customers and how they behave is one of the most important selling points for all companies. Usually, companies try to provide employees with more complete information about customers by integrating CRM software with accounting and support software. In this way, the customer no longer has to explain his problem from the beginning of every call (Obaid et al., 2022).

---

[1] Corresponding Author: Bayanati.Mahmonir@wtiau.ac.ir

Now, with the addition of data received from the Internet of Things, the company's information from the customer has become much more and more accurate, and even without the need to contact the customer, the company will understand the possible problems and issues of the customers (Bayanati et al., 2022). Using CRM software to collect and display information obtained from the Internet of Things along with other information, allows companies to have the needs of customers and their exact time at their disposal and unlike the past, they no longer have to wait for requests from the customer (Fallah et al., 2021).

CRM software is a very powerful tool, but its value is only as much as the data it contains. By focusing on analyzing the data received through smart devices, companies can respond to their customers' needs even before they ask (Ghahremani-Nahr et al., 2022). This is a very big advantage that makes the company completely different from its competitors in the mind of the customer. The Internet of Things is the connection of various objects and devices to the Internet, and in this way it solves the everyday problems of people and businesses in an innovative and simple way (Gharachorloo et al., 2021). This technology revolutionized communication with customers and people's daily life through the Internet. The Internet has dimensions beyond Machine-to-Machine (M2M) (Toloie-Eshlaghy et al., 2013). Of course, the benefits of the Internet of Things are not limited to M2M technology and can include a wide range of different things. IoT devices collect useful data with the help of various technologies and then transfer that data to other devices and systems autonomously (Nozari et al., 2023). The Internet of Things has led to the discovery of new ways of business income, improving the quality of life in some aspects, and providing innovative products and services. IoT has provided a new revenue stream for businesses, improving the quality of life in some sectors, and providing new innovative products and services. IoT consists of devices connected to the Internet and thereby solves the everyday problems of people and businesses in an innovative and simple way (Najafi et al., 2022).

Considering the role of the Internet of Things in data collection and storage and its high impact in customer relationship management, this study tried to investigate the most important features, effects, and benefits of this technology in customer relationship management.

2. The impact of the Internet of Things on customer relationship management

The Internet of Things will increase the maturity level of customer relationships and will have a profound impact on customer relationship management. This is because the huge data of the Internet of Things contains information about the customer, and textual inputs can greatly increase the capabilities of managing relationships with customers (Moeini et al., 2013). Therefore, the future of customer relationship management will be provided by cognitive computing, big data analysis, and creating deep knowledge in organizations. The Internet of Things is one of the most important and innovative areas of technology, which will definitely require a lot of investment; Because digital business is very important to maintain the competitiveness of organizations and the issue of customer relationship management (Nozari et al., 2022).

By using connected devices, which constantly share various information (such as customer behavior; activities; preferences) with intelligent systems, IoT provides a golden opportunity for businesses to gain deep insight and quality data. Today, CRM at its core includes customer-to-customer relationship management. The close interaction of devices with intelligent systems will open a new world for offering offers, and services; It will unlock superior and simultaneous support while innovating products and services (Nozari et al., 2020). Today, the Internet of Things is one of the most important trends in the digitalization of societies, and by using this technology, many business initiatives, including customer

relationship management, can benefit from it (Chen et al., 2022). As a new interactive channel, IoT will bring with it many promises and surprises for the field of customer relationship management of any organization. Internet of Things services and support for customer relationship management include:

- Improving the level of customer relationship management through interaction with the organization's knowledge bank (Nozari & Aliahmadi, 2022);
- Improving the quality of service by reducing the time of communication cycles;
- Reporting problems in real-time and appropriately to the company's customer service department;
- Providing the best service using a holistic view of customer information including location; weather; Specifications; preferences etc.;
- Providing automated instructions and fixed instructions, using the latest knowledge management database and cognitive systems; For example, IBM Watson
- Anticipating possible problems with services provided to customers and creating service opportunities to solve failures/problems even before they occur by providing product details; date of failure; Other service calls and advanced analytics without customer intervention.
- With IoT data, the database can automate customer service processes.
- The possibility of hospitals monitoring patients in remote meetings.
- Strengthening knowledge: IoT can help to a great extent in expanding the knowledge bank and improving the quality of knowledge, thereby enriching the analysis; cognitive calculations, and improving results.
- Reducing support costs in customer relationship management by reducing customer calls to the company; Improving support KPIs and...
- Ability to make smart order

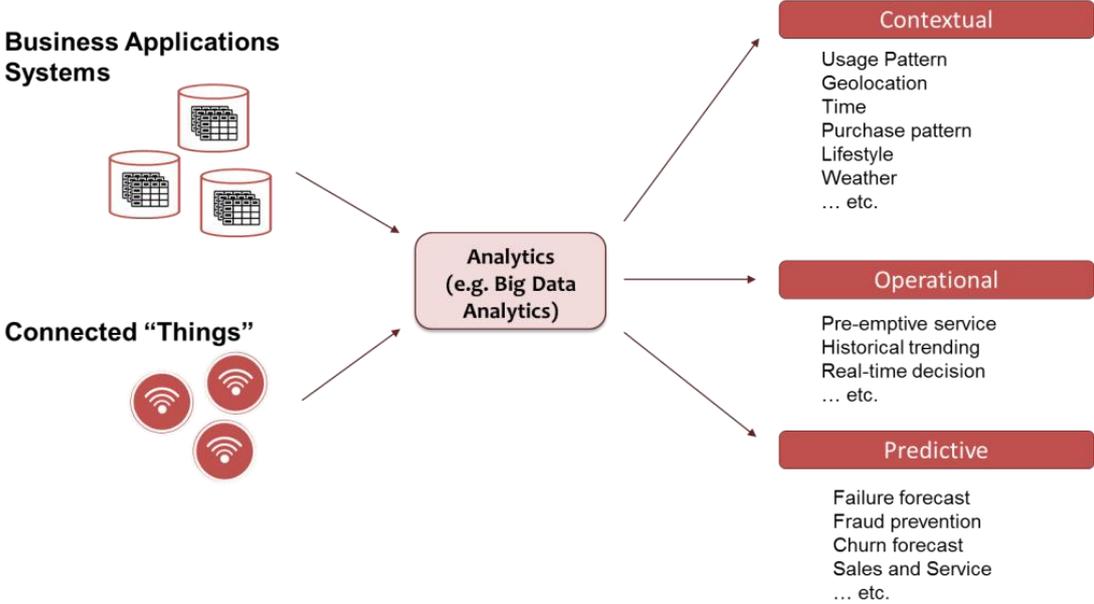Figure 1 shows the implications of Internet of Things (IoT) for CRM.

Fig. 1. Implications of the Internet of Things for CRM

3. IoT based CRM

IoT has a profound impact on CRM. Because so much IoT data contains customer-related information and textual inputs that can greatly enhance the capabilities of CRM systems (Nozari et al., 2022). This future will be realized in CRM software with cognitive computing, big data analysis, and deep knowledge in every industry and business process (Aliahmadi et al., 2022). IoT brings another level of maturity to CRM software. CRM has seen an evolution in the last two decades: from operational to analytical to social and now as "everything CRM" with humans at its center.

The power that IoT brings to CRM software is how to make sense of data based on a company's history of interactions, connect it to real data from "things" and create insight to take action. It's all about data and technology, and how CRM can leverage them (Tootian et al., 2022). The results of this work can be used at the moment or, if there is a suitable substrate, stored for later use. At the right time, data provide opportunities based on customer behavior, location, needs, and patterns. These opportunities can be in the fields of sales or service delivery or marketing. However, all of these CRM application areas and related sectors will benefit from IoT. This not only improves the customer experience but also creates a new revenue stream for businesses (Nozari et al., 2023).

With always-connected devices constantly sharing information (e.g. customer behavior, activities, functions) with intelligent systems, there is a golden opportunity for businesses to access massive amounts of quality data and deep insights. Today, CRM is customer relationship management that puts the customer at the center of things (Aliahmadi et al., 2022). Companies strive to provide a superior and optimal customer experience regardless of the communication channel they use – where IoT devices are one of the communication channels. The close interaction of devices with intelligent systems creates a new world for offering suggestions, personalized and contextual services, and superior support, while continuously innovating products and services (Bayanati , 2023).

In the following, we review some examples of the opportunities that IoT has brought in the field of CRM on a global level:

- ***Service and Support***

Connected "objects" are also channels for communication. Companies can improve the service delivery process through a combination of multi-channel interaction and a knowledge bank.

- ***Service improvement***
✓ Report problems in real-time to the organization's customer service department.
✓ Providing better services using a comprehensive view of the customer's information and device (location, weather), profile, preferences, and more (Nozari et al., 2022).

- ***Reduce support costs***

Since devices can enable support requests, customer calls to the company will be reduced, thereby reducing support costs. In many cases, before the service provider answers the phone, he sees the customer's previous problems and can find the right solution faster. In this way, a reduction of call time, reduction of the number of phone calls, and also improvement of support KPIs, such as "problem resolution with the first call", "waiting time" and "average call usage time" will happen.

- *Marketing*

Promotion design based on innovative products, pricing, and offers almost instantly without the need to base it on statistical models (Eisapour et al., 2013).

- *Strengthening knowledge*

IoT can greatly help in expanding the knowledge bank and improving the quality of knowledge, thereby enriching analysis, cognitive computing and improving results.

Figure 2 shows a conceptual framework for a customer relationship management system based on the Internet of Things.
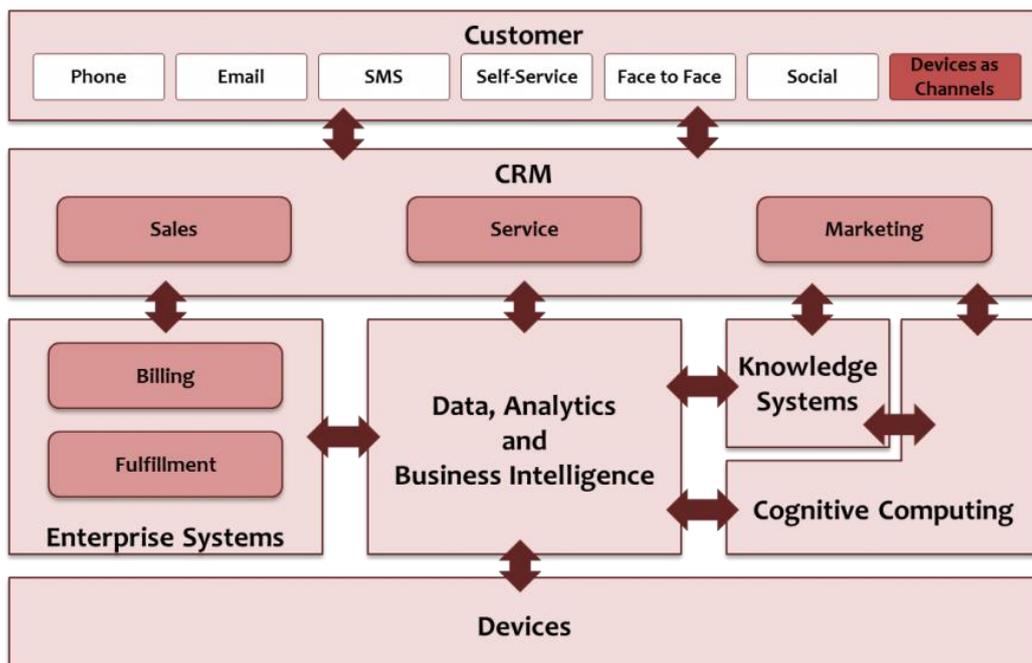

Fig. 2. Conceptual framework of CRM system based on IoT

4. Conclusion

To succeed through the use of CRM, companies need a fresh approach to customer centricity. This approach should be able to lead company managers to be aware of customers' needs and their expectations. IoT is one of the most important digitization trends in today's world. Many business initiatives, including CRM software, are created by increasing the penetration of devices connected to networks in all stages of life. IoT will be very promising as a new channel for CRM, and along with deep knowledge in the relevant sectors, it has the possibility to transform CRM into a pleasant experience for the customer. But now that big data and the Internet of Things (IOT) are widely used, we can access our customers' transaction information in more detail. Using this information, you can see when customers enter your store, how long they stay there, and what products they pay more attention to. It is also possible to access the basic information of buyers such as age, gender, level of brand loyalty, etc. Today, these events are possible not only for online experiences but also for physical experiences.

Despite all the advantages that exist for the customer relationship management system based on the Internet of Things, the use of the Internet of Things to improve the customer experience still has many shortcomings, and some new ideas and creativity will definitely be needed to implement it. The impact of any small action should not be underestimated, changes, however small, may make people have a really good experience with the organization. Therefore, even if a topic seems unimportant, you should try it and see the result.

References

- Aliahmadi, A., Nozari, H., & Ghahremani-Nahr, J. (2022). A framework for IoT and Blockchain Based on Marketing Systems with an Emphasis on Big Data Analysis. International journal of Innovation in Marketing Elements, 2(1), 25-34.
- Aliahmadi, A., Nozari, H., & Ghahremani-Nahr, J. (2022). Big Data IoT-based agile-lean logistic in pharmaceutical industries. International Journal of Innovation in Management, Economics and Social Sciences, 2(3), 70-81.
- Bayanati, M. (2023). Business Model of Internet of Things and Blockchain Technology in Developing Countries. International Journal of Innovation in Engineering, 3(1), 13-22.
- Bayanati, M., Peivandizadeh, A., Heidari, M. R., Foroutan Mofrad, S., Sasouli, M. R., & Pourghader Chobar, A. (2022). Prioritize Strategies to Address the Sustainable Supply Chain Innovation Using Multicriteria Decision-Making Methods. Complexity, 2022.
- Chen, Y., Bayanati, M., Ebrahimi, M., & Khalijian, S. (2022). A Novel Optimization Approach for Educational Class Scheduling with considering the Students and Teachers' Preferences. Discrete Dynamics in Nature and Society, 2022.
- Eisapour, K., Bayanati, M., & Yousefpour, J. (2013). A mathematical model for ranking R&D organizations as a technology development factor. Advances in Environmental Biology, 717-721.
- Fallah, M., & Nozari, H. (2021). Neutrosophic mathematical programming for optimization of multi-objective sustainable biomass supply chain network design. Computer Modeling in Engineering & Sciences, 129(2), 927-951.
- Fallah, M., Sadeghi, M. E., & Nozari, H. (2021). Quantitative analysis of the applied parts of Internet of Things technology in Iran: an opportunity for economic leapfrogging through technological development. Science and technology policy Letters, 11(4), 45-61.
- Ghahremani-Nahr, J., Aliahmadi, A., & Nozari, H. (2022). An IoT-based sustainable supply chain framework and blockchain. International Journal of Innovation in Engineering, 2(1), 12-21.
- Gharachorloo, N., Nahr, J. G., & Nozari, H. (2021). SWOT analysis in the General Organization of Labor, Cooperation and Social Welfare of East Azerbaijan Province with a scientific and technological approach. International Journal of Innovation in Engineering, 1(4), 47-61.
- Moeini, E., Bayanati, M., Givi, S. B., & Soheili, S. (2013). Individual social responsibility a platform for intellectual property rights: Iranian users of CDs case. Advances in Environmental Biology, 709-717.
- Najafi, S. E., Nozari, H., & Edalatpanah, S. A. (2022). Artificial Intelligence of Things (AIoT) and Industry 4.0–Based Supply Chain (FMCG Industry). A Roadmap for Enabling Industry 4.0 by Artificial Intelligence, 31-41.
- Nozari, H., & Aliahmadi, A. (2022). Lean supply chain based on IoT and blockchain: Quantitative analysis of critical success factors (CSF). Journal of Industrial and Systems Engineering, 14(3), 149-167.
- Nozari, H., & Nahr, J. G. (2022). The Impact of Blockchain Technology and The Internet of Things on the Agile and Sustainable Supply Chain. International Journal of Innovation in Engineering, 2(2), 33-41.
- Nozari, H., & SADEGHI, M. E. (2020). Identifying the challenges facing the telecommuting plan and providing solutions for its effective implementation-a case study of the ministry of industry, mines and trade.
- Nozari, H., & Szmelter-Jarosz, A. (2022). IoT-based Supply Chain For Smart Business (Vol. 1). ISNET.
- Nozari, H., Ghahremani-Nahr, J., & Szmelter-Jarosz, A. (2023). A multi-stage stochastic inventory management model for transport companies including several different transport modes. International Journal of Management Science and Engineering Management, 18(2), 134-144.
- Nozari, H., Ghahremani-Nahr, J., & Szmelter-Jarosz, A. (2023). AI and machine learning for real-world problems. Advances In Computers, (online first).
- Nozari, H., Sadeghi, M. E., & Najafi, S. E. (2022). Quantitative Analysis of Implementation Challenges of IoT-Based Digital Supply Chain (Supply Chain 0/4). arXiv preprint arXiv:2206.12277.

- Obaid, H. S., & Nozari, H. (2022). Examining Dimensions and Components and Application of Supply Chain Financing (In Chain Stores). International Journal of Innovation in Management, Economics and Social Sciences, 2(4), 81-88.
- Toloie-Eshlaghy, A., & Bayanati, M. (2013). Ranking information system success factors in mobile banking systems with VIKOR. Middle-East Journal of Scientific Research, 13(11), 1515-25.
- Tootian, S., Bayanaty, M., & Jalali, A. (2022). Identify The Dimensions And Components Of Communication Technology In Order To Empower Women Entrepreneurs In Business. An Approach to Business Management, 2(4), 32-49.