A bibliometric analysis of self-ordering systems research using vosviewer

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Abstract. In this era of society, various sectors, including the food and beverage industry, are keen on integrating technological systems into their operational workflows to help the growth of the business itself. The adoption of technology systems in business processes, such as self-ordering system kiosks, tablets, or QR code menus, has become an emerging trend, including many stores, hotels, airports, and restaurants that eliminate inefficiency of manual ordering and reducing paper waste due to book menu. Many restaurants have been enabling customers to use a QR code method to order menus from their tables, which makes this study aim to examine the impact of self-ordering with QR codes within the scientific community. The literature review method is used in this research by analyzing 324 data encompassing a diverse range of sources, including articles, reviews, conference papers, books, and book chapters conducted since June 2023, spanning the publication years from 2018 to 2023. The analysis shows keywords related to self-service technology, technology acceptance, restaurant, etc. have been emerging trends within scientific community apart from there are gaps for further study. Nevertheless, self-ordering systems with QR codes are sought after for their potential to enhance efficiency and speed, reduce human error, save costs, improve the customer experience, and provide real-time order tracking. Using self-ordering is also related to the SDGs in improving industry, innovation, and infrastructure because it can support inclusive and sustainable industry.

1 Introduction

People in the current era use many technology systems that can help their daily lives. As we know, many restaurants throughout the world do not yet have services such as self-ordering system although now it's popular for its convenience and impact the market competition. Nowadays, self-ordering systems using QR codes have become more popular due to the inefficiency of manual ordering which can make a restaurant's operational activities less efficient in terms of human errors, order processing times, queue times. Furthermore, Moreover, the surge in COVID-19 cases in 2020 prompted a broader shift towards contactless business processes. Consequently, many restaurants seized the opportunity to enhance safety measures and streamline operations by overhauling their ordering systems and to achieve SDGs by eliminating traditional menu books and physical receipt. The use of self-ordering system should be implemented in many restaurants because previous studies have stated that the use of self-ordering system has a big impact in reducing the time and energy of workers in a restaurant, that it can also have a significant impact on the effectiveness of a restaurant that uses self-ordering systems and user satisfaction [1]. Self-ordering system can be used with QR codes. QR codes were adopted as a key component by many applications and services and have become an everyday feature in China [2]. The existence of QR codes can facilitate user interaction with social media platforms, payment systems, customer memberships, food delivery, transportation, and much more easily [3].

This self-ordering system with QR codes will provide convenience for restaurant employees while on duty, apart from that, consumers who eat at the restaurant will also feel satisfied through this service because customers can select, place, and pay via this interactive interface [4]. This method of processing orders in restaurants increases efficiency and reduces time based on QR codes without requiring the presence of a waiter at the table by replacing several stages of traditional order service [5]. The growth of a restaurant depends on its management information system, which manages most of these transactions as personnel scheduling to customer service, in addition to increasing profitability as well as providing an empowering environment for customers to eat and dine [6].

This research aims to explore research progress related to Self-Ordering with QR codes. This research analyzes bibliometric maps and research/publication trends in the Scopus database using VOSviewer software. [7] Bibliometrics is an effective tool because it contains valuable data sets that can be utilized by policymakers, researchers, and other stakeholders to improve the quality of research [8]. It will also provide gaps and recommendations for future research on a particular topic.

The research questions for this study are:
2 Literature Review

The focus of this research is awareness of the use of Self-ordering using a QR Code which contains information on distribution, use, and incidents related to the current environmental conditions of machine use [9]. Many restaurants use this system to attract people. So that people can increase their use of self-service ordering via QR Code and keep up with developments in the digital era [10].

The rapid developments of technology have resulted in various innovations including new trends in providing customer services, such as Self-Service Technology (SST) [11]. SST is a technological interface that enables customers to produce a service independent of direct employee involvement [12]. As advanced technologies have a high impact and influence on business research and marketing strategy, manual labour has been replaced with technology [13], such as Self-Service Technologies (SSTs) Meanwhile, some are in the food industry, aviation, hospitality, and others. Many restaurant companies have adopted SSTs in various ways that want customers to be able to use a tablet, QR code ordering, and self-service Kiosks – an automated payment system that enables customers to examine menus, order, and pay right away [14]. Furthermore, it is known that SST implementation in restaurants has resulted in higher profits as compared to when they exclusively gave manual human service [15].

Self-ordering with a QR code makes someone feel the value of a product/service that is consumed, it will change consumer behavior to become loyal. A good system is not only judged from the aspect of speed, but a good system can also be explained from other aspects such as convenience, hassle-free, and more [7].

3 Methodology

This research uses quantitative methods and uses bibliometric analysis to analyze bibliographic data in articles/journals. This research use of secondary data collection involves the use of existing data collected by Sources, Scopus Databases, Publicly Available Data, and Previous Research Studies. This research aims to collect and analyze research on topics that are correlated from non-numerical data to obtain results as an understanding and summary of social topics with the topic of self-ordering with QR code. On June 17, 2023, research began with an online search with the keyword "Self-Ordering with QR Code" and other similar keywords that matched the criteria of the topic, such as “Self-service technology” and “Restaurant”. By analyzing journals that correlate with the topic of self-ordering and collecting all abstracts from journals to produce requirements. The journal criteria for this paper must be in the last 5 years and correlates with the topic “Self-ordering with QR Code” and collect journals from the Scopus database [16].

This research analyzes data using sample papers in .csv format obtained and processed using VOSviewer to create bibliometric maps. VOSviewer is a software tool to help build and visualize bibliometric networks, users can use journals, researchers, or individual publications for network examples, and they can be built based on citations, bibliographic coupling, co-citation, or co-authorship relationships. VOSviewer also offers many visualization options such as heatmaps [17].

The analysis results resulting from Vosviewer analysis will be collected as maps and demographics to observe all topics from Scopus journals. This is done by looking at relevant topics over the last 5 years, such as suggestions for relevant topics and topic gaps for other researchers. Observations provide information about gaps and trends in the journal. Analysis using Vosviewer helps to carry out data mining and analysis of research carried out correctly. To carry out accurate data analysis, Vosviewer can carry out quick analysis of journals that have been searched and collected. Vosviewer's capacity to combine published data from several publication databases is one of its advantages. Users can combine publication data from various sources into one and present it in simple visuals [18].

4. Results and discussion

4.1 Themes Classification

Research in this section to answer the question "What themes are suitable for classifying self-ordering with QR codes in restaurants?" Colorful depictions of bibliometric data in the form of network visualization, overlay visualization, and density visualization were produced using a total of 343 sources from SCOPUS (journals, books, conference proceedings, book series) and analyzed using the VOSviewer application. To better understand trends and impact by source, VOSviewer defined 5 terms for this study. Five clusters—red, green, blue, yellow, and purple—in the VOSviewer tool it is used to view analysis data that shows a relationship between several resource themes. Meanwhile, the size of the circle is correlated between the appearance of keywords in the title and abstract, the more keywords appear, the larger the size pattern displayed.
There was previous research which consisted of 324 documents in 2018–2019 and 19 documents in 2020–2023. The following are details of the research documents including Books (18), Book Series (1), Conference Proceedings (145), and Journals (179), extracted to provide the best results. The terms self-service technology, technology acceptance, customer experience, and service quality are located in the same cluster (red area) in the topic area visualization in Figure 1, then there is food located in the yellow cluster; restaurants, consumer, and humans in green cluster; commerce in purple area; consumer attitude, satisfaction, and choice behavior in blue area which shows a close relationship between these keywords.

4.2 Trend Keywords Classification

This part to answer the question "What are the trends in studying awareness of self-ordering with QR codes in restaurants since 2018?"

Meanwhile, Figure 2 shows an visualization of topic areas in scopus database using VOSviewer overlay visualization analysis of keyword trends based on year to year related to this research that can be seen from the color (purple, blue, green, and yellow). The topic of consumer, food, consumer attitude had more significant research in late 2018 and early 2019 and decreased slowly to Q2 in 2019. The topic of humans, choice behavior and humans, has increased in 2020. Meanwhile, restaurant, service quality, and customer experience became keywords trend in 2021 until early 2022. Keyword self-service technology, technology acceptance, self-service kiosks, and satisfaction has increased in recent years, as well as implementation and transition to society 5.0 which requires self-ordering, especially for ordering food, applying technology, customer satisfaction, and comfort in using the system [19]. Customer satisfaction is a priority for restaurant business owners, so it is important to use technology using self-ordering in the coming year. Currently, technology has become part of our daily lives in searching for information, updating activities, and interacting with people. The research theme of awareness of the use of self-ordering in the world will be necessary and will probably become a trend in the coming years, especially when manual ordering in restaurant becomes less popular.

4.3 Gaps

This section is to answer the question "What gaps have been identified in self-ordering with QR codes in restaurants for further study?"

Meanwhile, Figure 3 shows keywords that have From Figure 1-2, analysed by its density. It can be observed that the brighter or denser the glowing green color behind a keyword, the more research has been conducted on that particular keyword. On the other hand, if a keyword has a darker density, it indicates that there is relatively less research associated with that keyword. Therefore, refer to Figure 3, keywords that often appears are self-service technology and restaurant, are most likely to be devoted by the researchers. While keywords satisfaction, technology acceptance, service quality, and customer experience, are not really be paid attention to, though it is still related. From this data, it can be implied that, research can be improved by researchers for further examination to minimize the gaps relating the topic of user satisfaction, technology acceptance, self service quality, and customer experience. For example, little research has been carried out regarding examples of the use of self-ordering using QR codes. So, researchers can contribute to address the importance of using self-ordering with QR codes and
conducting further studies and its influence from less dense topic. Furthermore, the availability of information on each topic area can be searched by entering more specific keywords. The analysis that will be carried out on the topic of using self-ordering with QR codes in the world can also be seen from several studies conducted by other researchers.

4.4 Self-ordering with QR Code

This part answers the question "Why is awareness of self-ordering with QR codes important for users?"

The results of the analysis illustrate that a fresh consumer mindset, restaurant cleanliness, and the use of self-ordering are important indicators of consumers' intention to eat again at a restaurant. This research expands our knowledge about consumer preferences and behavior in using self-ordering. This also makes an additional contribution towards strengthening theoretical assumptions. Implications for theory and practice are determined for relevant stakeholders. Previous research saw that 65% of customers said their frequency of visits would increase if the restaurant implemented a self-ordering machine. The results also show that as many as 30% of customers prefer to order via a kiosk compared to ordering via a cashier because it saves time [17].

5 Conclusion

Using a self-ordering machine makes it easier for customers to choose food by looking at the menus available on the machine, so customers will feel more comfortable. Customers can freely choose the menu. Self-Ordering Machines provide an opportunity to improve and change the customer experience when eating at a restaurant. The use of technology by society which is considered important provides confidence that its users will be able to obtain the same benefits and values as those obtained by other people. Social influence will have an influence on customer behavior. Customers who do not have experience with certain products and services usually rely on information from family or colleagues so that at the end these customers can adopt new technology [18]. Customer satisfaction can support system use. Customers pay great attention to various facilities such as resources and technology used in the implementation system. The system implemented must be able to eliminate obstacles felt by users. In self-order machines, facilities are needed that allow customers to adopt systems such as functions to access the screen easily [19]. From figures 1, 2 and 3, it can be seen that the results of keyword trends from year to year related to this research. The topic of self-service technology had more significant research in 2022 until 2023. The topic of self-ordering has increased in recent years, as well as implementation and transition to society 5.0 which requires self-ordering, especially for ordering food, applying technology, customer satisfaction, and comfort in using the system [18], [19]. The analysis of keyword suggests that certain keywords like self-service technology and restaurant have received considerable attention, there is a need for increased research focus on keywords such as satisfaction, technology acceptance, service quality, and customer experience in the context of self-ordering, particularly with QR codes, indicating potential areas for improvement and further exploration in the field. Self-ordering systems can help restaurant operations in receiving orders, make it easier for customers to order food from their respective tables, reduce the time and energy of workers in a restaurant, it can also have a significant impact on the effectiveness of a restaurant that uses self-ordering systems and user satisfaction. Moreover, the use self-ordering is also related to the SDGs in improving industry, innovation, and infrastructure because it can support inclusive and sustainable industry. This research could help food and beverages industry to consider the use of self-ordering systems to increase their competitive advantage and other researcher as a reference to their paper.

References

16. C. Alfaren and R. Arijanto, Bit-Tech 4, 1 (2021)