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Digital-Based Healthy Market Innovations: A Case Study of Oro-Oro Dowo Malang, Indonesia

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Authors' contributions

This work was carried out in collaboration among all authors. Author ZS was primarily responsible for designing the research framework, preparing the methodology and coordinating data collection in the field. Author IAK contributed to data analysis, interpretation of findings and the development of the discussion section. Author YD focused on the literature review, drafting and refining the manuscript to ensure academic quality and coherence. All authors contributed to editing the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study aims to examine the innovative methods and development strategies implemented in Oro-Oro Dowo Market, Malang, East Java. It evaluates how these innovations contribute to building a sustainable and healthy local economy, while also identifying key obstacles and opportunities in maintaining the "healthy market" initiative. Furthermore, the study explores how the Oro-Oro Dowo Market model can be adapted to other traditional markets as a pathway for broader national and regional development.

Study Design: This qualitative descriptive phenomenological case study employed data triangulation from three key stakeholder groups—traders, market managers, and consumers.

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Place and Duration of Study: The research was conducted at Oro-Oro Dowo Market, Klojen District, Malang City, East Java, which was selected as a revitalized traditional market that has successfully integrated digital innovations and strengthened local welfare.
Methodology: Primary data were collected through interviews, questionnaires, and field observations involving 46 consumers, 48 traders, and 6 market managers. Participants were selected using purposive sampling to ensure direct engagement with the market's operations and innovations. The analysis was conducted in three stages: data reduction, descriptive presentation, and synthesis to identify recurring patterns, with triangulation used to validate findings.
Results: The findings indicate that Oro-Oro Dowo Market is widely recognized for its cleanliness, order, and security, supported by innovations such as structured zoning, modernized facilities, and the installation of CCTV. Stakeholders also noted the positive impact of digitalization, with widespread use of QRIS and social media for transactions and promotion. Nevertheless, several challenges persist, including incomplete sanitation facilities, the absence of systematic waste separation, and limited digital literacy among some traders. While issues of informal control (premanisme) remain, they are relatively minimal compared to many other traditional markets.
Conclusion: Oro-Oro Dowo Market demonstrates how revitalization strategies—combining facility upgrades, improved governance, and gradual digital adoption—can transform a traditional market into a sustainable and trusted community hub. The market's success in enhancing safety, cleanliness, comfort, and stakeholder confidence underscores its potential as a replicable model for fostering sustainable local economies. To strengthen its impact, ongoing improvements are needed in waste management, equitable facility distribution, and capacity-building for digital literacy. Beyond Indonesia, this model offers valuable lessons for other developing countries seeking to modernize traditional markets while preserving their cultural identity and promoting inclusive economic growth.

Keywords: Healthy market; traditional market; revitalization; digitalization; sustainable local economy.

1. INTRODUCTION

A population's health is greatly influenced by its surroundings and healthcare access (World Health Organization, 2023). Access to vital requirements makes public spaces, especially traditional markets, important in daily life. However, these markets may be disease transmission hubs. The cholera outbreak in Latin America, SARS epidemic, and avian influenza pandemic in Asia showed how markets transmit infectious diseases (Kolinski et al., 2024). Markets are crucial community hubs and possible health concerns, highlighting the urgent need to rethink their design, administration, and function in a fast changing social and economic setting.

Modern and traditional markets dominate today. Traditional marketplaces feature face-to-face transactions and bargaining. They usually have stalls, kiosks, booths, and open spaces that vendors or market administrators run (Tanjung et al., 2024). Modern marketplaces operate with little direct engagement. Fixed pricing are displayed, and transactions are normally done alone or with store personnel. These markets are usually well-organized and cleaner than traditional markets (Badan Pusat Statistik, 2023).

Despite these contrasts, traditional markets are vital to Indonesia's economy and society. They supply affordable daily basics and are part of local culture (Kementerian Perdagangan Republik Indonesia, 2021). However, modern retail has rapidly marginalized traditional markets in recent decades. Traditional markets are losing visitors to cleaner, safer, and better-organized modern marketplaces. Deteriorating infrastructure, inadequate sanitation, and lack of facilities make many of these marketplaces appear unsanitary and disorganized (Fitriani et al, 2021). The gap between competitive, healthy markets and reality is a major policy and development issue. According to the Pangiuk (2018) there is 13,450 traditional Indonesian markets with over 12 million traders and market personnel. These markets are essential to the national economy since approximately 50 million people depend on them.

Recognizing this, Indonesia has implemented regulations to make traditional markets healthier and more competitive. This transformation is based on the Ministry of Home Affairs and Ministry of Health's joint regulations (No. 34 of 2005 and No. 1138/Menkes/PB/VIII/2005), which emphasize healthy cities and districts, with healthy markets as a key factor. Studies show many traditional markets fall short of these norms. Bachrie et al. (2021) observed that many Indonesian marketplaces violate the Decree of the Minister of Health (No. 519/MENKES/SK/VI/2008). Markets can become health hazards and lose attractiveness to modern consumers due to poor spatial layout, mixing wet and dry market sections, and poor cleanliness. Traditional markets are finding it harder to compete with modern retailers.

Presidential Regulation No. 112 of 2007 on the Management and Development of Traditional Markets, Shopping Centers, and Modern Stores has led revitalization efforts to solve these issues. Revitalisation involves physical, social, and economic improvements to decaying urban environments. Mangeswuri & Purwanto (2010) suggests reframing marketplaces as multifunctional public spaces that include economic, social, and cultural components. Revitalization should boost small-scale traders' economic resilience as well as profits. In this scenario, sustainability requires developer and creative management model collaboration.

Oro-Oro Dowo Market in Malang, East Java, illustrates this change. As a "Healthy Market," Oro-Oro Dowo is a traditional market that has adapted to modern demands while keeping its culture. Its creative methods to cleanliness, order, and professional administration have reinvigorated traditional Indonesian marketplaces (World Health Organization Indonesia, 2024). Service quality, management techniques, and community engagement are among the advancements beyond sanitation systems, waste management, and stall arrangement. These multifaceted measures have increased market competitiveness, entrepreneurship, and local economy.

This study aims to investigate Oro-Oro Dowo Market's innovation methods and development techniques in light of these advancements. What innovation and development strategies has Oro-Oro Dowo used? Are these innovations helping establish a sustainable and healthy local economy? (c) What obstacles and opportunities exist in preserving the healthy market initiative within Indonesia Emas 2045? (d) How might Oro-Oro Dowo's concept be duplicated or adapted in other traditional markets to promote national development?

This research has four goals. First, identify and describe Oro-Oro Dowo Market innovations and development plans. Second, to assess how these techniques affect local economic growth. Third, to examine the obstacles and prospects of maintaining the healthy market program in line with Indonesia Emas 2045. Finally, to demonstrate how Oro-Oro Dowo's healthy market model may be applied elsewhere to foster inclusive, community-based economic resilience.

This study seeks to inform policymakers, local governments, communities, and stakeholders managing traditional markets. The research emphasizes the necessity of renewing traditional markets as engines of sustainable local development by presenting Oro-Oro Dowo as an example of creativity and adaptability. It supports Indonesia Emas 2045's long-term vision of robust local economies and healthy public spaces laying the groundwork for national prosperity.

2. METHODOLOGY

2.1 Research Type and Approach

This study uses a qualitative descriptive phenomenological technique to investigate the replication of innovations in the Healthy Market of Oro-Oro Dowo Malang. Creswell (2013) describes qualitative research as an examination into human experiences and social phenomena through participant observation and data gathering, which is examined and written up. The study uses firsthand fieldwork to capture the research setting's natural conditions. Interviews with key informants and market observations provide most data. Descriptive phenomenology, a qualitative method, stresses detailed and exact descriptions of distinct individual or group experiences relating to a phenomenon while avoiding personal interpretations. This helps understand how individuals see, interpret, and interpret their lives. Gillham (2000) further notes that no single sort of evidence is sufficient or valid, hence case study research must use many data sources. This study examines Oro-Oro Dowo's replication of healthy market innovations, including cleanliness, safety, transaction convenience, and other factors that promote local economic success.

2.2 Research Location and Subjects

The research site of this study is Oro-Oro Dowo Market, located in Klojen District, Malang City, East Java, which serves as a prominent example of a revitalized traditional market that has successfully transformed into a healthy and modern trading hub. This market is distinctive in its integration of digital-based innovations within its management system, environmental hygiene practices, and financial transactions, reflecting a unique synergy between local wisdom and technological advancement in the traditional commerce sector. Several key considerations underlie the selection of Oro-Oro Dowo Market as the focus of this study. First, the market has been positioned as a role model within the local government's program for revitalizing healthy traditional markets, thus offering valuable insights for potential replication in other regions. Second, its successful adoption of digital innovations—such as trader information systems, e-retribution mechanisms, and cashless payment services—presents a compelling case for examining the sustainability of local economic growth in the digital era. Third, the market's contribution to improving the welfare of local traders and sustaining the cultural heritage of traditional markets demonstrates its strategic relevance to the broader vision of Indonesia Emas 2045. Collectively, these factors make Oro-Oro Dowo an exemplary site for exploring the intersection of innovation, tradition, and sustainable development.

The participants of this case study research consist of three key stakeholder groups within the market ecosystem: traders, market managers, and consumers. These groups were selected using purposive sampling, ensuring that each informant possesses direct experience relevant to the phenomenon of replicating healthy market innovations. Traders contribute insights from the entrepreneurial perspective, market managers provide views on managerial and operational aspects, while buyers offer consumer-oriented perspectives. This triangulation of voices allows for a more comprehensive understanding of the studied phenomenon, with data from their experiences serving as the foundation for analysis in this case study (Creswell, 2013).

2.3 Data, Data Types and Data Collection Techniques

This study used primary and secondary data. Interviews with market managers, traders, and regular customers at Oro-Oro Dowo Market provided primary data, while secondary data came from relevant scientific journals and scholarly literature. The study included 46 consumers, 48 traders, and 6 market managers, all of whom were purposively sampled to ensure their direct involvement and experience with market activities, innovations, and digitalization. Data was collected through interviews, questionnaires, and field observations. Building rapport and creating a comfortable environment with informants ensured mutual awareness of the research goals, followed by active engagement in important market activities to acquire accurate and context-rich information. Structured data from selected respondents was collected via questionnaires and examined across four variables. Importantly, questionnaire data were linked with field observation findings to provide a more holistic, nuanced, and thorough examination of innovations within the healthy market framework (Gillham, 2000; Creswell, 2013).

2.4 Operational Definitions of Variables and Data Analysis

This study analyzes the state of a "Healthy Market," which is the dependent variable. This condition is thought to be affected by four distinct variables: safety, cleanliness, facility availability and quality, and market digital technology use. These criteria are key to the running and competitiveness of Oro-Oro Dowo Market as a regenerated traditional market. The descriptive qualitative approach allows systematic analysis of field findings to reveal the meanings embedded in observed practices and stakeholder experiences about healthy market innovations and sustainable economic growth (Creswell, 2013).

The data analysis procedure has three steps. The first stage of data reduction filters interviews with traders, market managers, and consumers and direct observations to keep only data relevant to the research objectives. The reduced data is utilized to identify advancements including waste management, sanitation, comfort, and digital transaction methods. These innovations are examined for their economic effects on merchants' income, community welfare, and inclusive local economic growth. Second, data is organized and presented in descriptive narratives and thematic matrices. The visual and textual tools show how innovations, economic achievements, and sustainable development goals are linked. The analysis may show how market management innovations boost economic competitiveness and policy. Synthesizing patterns leads to findings that emphasize locally anchored innovations' role in reinforcing traditional markets amid modern competition, linked with Indonesia Emas 2045. Two methods are used to verify findings: triangulation of sources by cross-checking data from multiple informants and instruments, and member checking by confirming interpretations with key informants to ensure alignment with their perspectives (Gillham, 2000).

3. RESULTS AND DISCUSSION

3.1 Market Profile

Malang's Oro-Oro Dowo Market is a cultural and historical landmark. The market, one of the city's oldest, has been on Guntur Street in Klojen since 1932, under Dutch colonial rule. Over 250 vendors in kiosks and booths occupy 3,400 square meters. Almost a century old, the market is still busy. Its Dutch colonial architecture and recent restorations give it a distinct aura that sets it apart from other traditional marketplaces. The Javanese term “Oro-Oro Dowo” means “a wide open field,” reflecting the area's environment before it became a commerce center. This market has been a social and economic hub in Malang for decades.

Oro-Oro Dowo Market has improved significantly, especially following the Malang City Government's 2006 redevelopment and regular maintenance. One of the city's cleanest and orderliest marketplaces, it is today. The zoning system is well-organized, with sections for vegetables, fruits, fresh meat and fish, everyday essentials, local snacks, and ready-to-eat goods. Well-maintained amenities include enough parking, prayer rooms, clean restrooms, a lactation area for moms, hand-washing stations, and CCTV monitoring. The market is busiest between 5:00 and 10:00 a.m., when sellers set up shop and shoppers of all ages—from homemakers to young people—fill the aisles. The administration of this ancient market has adopted new methods. QRIS payments, local organization-led online purchasing and delivery, and social media promotion are becoming common among merchants. Some vendors stay open until late afternoon, even though activity slows after midday.

Oro-Oro Dowo Market supports local MSMEs in addition to trade. Trade is a key source of income for many families, particularly those who have traded for generations. Bazaars, cleanliness contests, entrepreneurship training, and product marketing are also organized by the government and market administration to enhance commercial and social relations. Market laws, enforced by municipal legislation and corporate procedures, maintain order and boost the market's image. Oro-Oro Dowo Market shows that traditional markets may persist in the contemporary age without losing their cultural character with its cleanliness, regulated zoning, appropriate amenities, and digital technology. It inspires Indonesian traditional markets with its successful adaptation and innovation.

3.2 Market Conditions

One of Malang City's most famous traditional markets is Oro-Oro Dowo Market in Jalan Guntur, Oro-Oro Dowo Village, Klojen District, East Java. This market, founded in 1932 during Dutch colonial rule, is one of Malang's oldest and remains a significant commercial and social core. The market has 251 dealers in 71 kiosks and 180 stalls over 3,400 square meters and continues to operate. Despite multiple renovations, Oro-Oro Dowo Market still blends colonial-era architecture with modern amenities, attracting locals and tourists. The term "Oro-Oro Dowo," derived from Javanese, means "a wide open field," reflecting the area's landscape before it became a marketplace. After over a century, the market has become a cultural and historical landmark as well as a commercial center, affecting Malang's economic and social dynamics.

Facility and governance improvements have shaped Oro-Oro Dowo Market. The Malang City Government's Department of Cooperatives, Industry, and Trade began a major redevelopment project in 2006 and continues to maintain it. The 2015 redevelopment made Oro-Oro Dowo one of Malang's cleanest and most orderly markets. These successes were made possible by local government, market administrators, and traders who actively supported the redevelopment campaign. Today, explicit zoning procedures divide the market into sections for vegetables, fruits, fresh fish and meat, staple products, prepared dishes, and traditional snacks. Facilities including large parking, clean restrooms, prayer rooms (mushola), breastfeeding rooms, handwashing stations, excellent drainage, and CCTV surveillance have improved its reputation. The market is busiest every morning from 5:00 to 10:00 with homemakers, elderly, and young buyers. While many traders embrace digital tools like QRIS payment systems, online shopping and delivery services in collaboration with Bank BRI and Kadin UMKM Malang, and social media platforms for promotion, the market's traditional sound of bargaining in the morning air remains. Most traders close at midday, although some stay open till afternoon.

Oro-Oro Dowo Market supports MSMEs beyond its economic function. Many of its dealers are generations-old family companies, making the market vital to local economic viability. The government arranges bazaars, entrepreneurial training, cleanliness competitions, and local product promotions, which give the market a significant social dimension. The local government and market management stress responding to new advances through company management training and partnerships to boost competitiveness. Regulatory frameworks like Malang City Regulation No. 12 of 2004 on Market and Trading Management and market manager-issued operational rules like stall ownership regulations and operating hours have maintained market discipline. Market walls display regulations to encourage vendors and tourists to comply. Oro-Oro Dowo Market shows how traditional markets may improve while retaining their culture through cleanliness, controlled zoning, proper facilities, and digital integration. Its success shows that innovation and adaptability are essential to keeping people's markets relevant and resilient in the face of current retail competition (Diskopindag Malang, 2020).

3.2.1 Buyer perceptions of hygiene, sanitation and digitalization at Oro-Oro Dowo market, Malang

The survey results (Primary Data Processed, 2025) reveal that buyers generally perceive Oro-Oro Dowo Market as maintaining a positive level of hygiene, sanitation, and digital readiness. Almost half of respondents (43.48%) rated the market as “good,” while 30.7% considered it “fair,” and 17.3% expressed strong satisfaction by selecting “very good.” Nevertheless, a smaller proportion of buyers indicated less favorable experiences, with 6.35% assessing the market as “poor” and 2.17% as “very poor.” These findings suggest that although positive perceptions dominate, further improvements remain necessary to comprehensively meet consumer expectations and enhance market sustainability (Table 1).

3.2.2 Vendor perceptions of hygiene, sanitation and digitalization at Oro-Oro Dowo market, Malang

Overall, the majority of traders expressed a positive perception of the healthy market concept at Oro-Oro Dowo. More than half (52%) rated it as “good,” while about a quarter (26.25%) assessed conditions as “fair.” Meanwhile, a smaller proportion (16.5%) reported being highly satisfied, describing the market as “very good.” In contrast, some traders still perceived shortcomings, with 3.92% rating conditions as “poor” and 1.33% as “very poor.” These findings indicate that, although overall perceptions lean positively, improvements remain necessary to address concerns among a minority of traders (Table 2).

3.2.3 Market manager perceptions of hygiene, sanitation and digitalization at Oro-Oro Dowo market, Malang

The findings from Table 3 illustrate that the majority of market managers perceive the hygiene, sanitation, and digitalization aspects of Oro-Oro Dowo Market positively. Overall, 55.33% of respondents assessed the market as being in “good” condition, 25.33% considered it “fair,” while 16.67% expressed strong satisfaction by rating it “very good.” Only a small proportion reported dissatisfaction, with 2% categorizing the market as “poor” and 0.67% as “very poor.” These results suggest that Oro-Oro Dowo Market is generally perceived as healthy and well-maintained, though there remains room for further improvement, particularly in areas such as infrastructure and the integration of digital systems.

From a security standpoint, the market demonstrates a favorable environment for both traders and visitors. The survey revealed that 50% of managers regarded market security as “very good” and 33.33% as “good,” while 16.67% considered it “fair.” Importantly, no respondents categorized security as “poor” or “very poor.” This aligns with direct field observations, where no suspicious or criminal activities were recorded. Similarly, traders and consumers shared positive views: 58.3% of traders and 60.87% of consumers rated security as “good,” while around 20% in both groups rated it “very good.” These findings reflect that the presence of regulations, posted rules based on Malang City Regulation No. 12 of 2004, and mutual trust among market actors have contributed to a secure and orderly environment.

Table 1. Buyers' perceptions of hygiene, sanitation and digitalization at Oro-Oro Dowo Market, Malang

No	Market Aspect	Very Poor	Poor	Fair	Good	Very Good	Total
1	Market security	0 (0%)	1 (2.17%)	8 (17.39%)	28 (60.87%)	9 (19.57%)	46 (100%)
2	Parking area	1 (2.17%)	1 (2.17%)	13 (28.26%)	25 (54.35%)	6 (13.04%)	46 (100%)
3	CCTV	0 (0%)	1 (2.17%)	11 (23.91%)	21 (45.65%)	13 (28.26%)	46 (100%)
4	Thuggery	10 (21.74%)	14 (30.43%)	11 (23.91%)	9 (19.57%)	2 (4.35%)	46 (100%)
5	Theft incidence	0 (0%)	0 (0%)	15 (32.61%)	22 (47.83%)	9 (19.57%)	46 (100%)
6	Stall condition	1 (2.17%)	1 (2.17%)	14 (30.43%)	19 (41.30%)	11 (23.91%)	46 (100%)
7	Trade space arrangement	0 (0%)	0 (0%)	15 (32.61%)	15 (32.61%)	16 (34.78%)	46 (100%)
8	Roof/ceiling condition	0 (0%)	2 (4.35%)	16 (34.78%)	23 (50%)	5 (10.87%)	46 (100%)
9	Building structure	0 (0%)	3 (6.52%)	19 (41.30%)	17 (36.96%)	7 (15.22%)	46 (100%)
10	Waste bins in toilets	1 (2.17%)	3 (6.52%)	20 (43.48%)	16 (34.78%)	6 (13.04%)	46 (100%)
11	Lighting condition	0 (0%)	1 (2.17%)	15 (32.61%)	20 (43.48%)	10 (21.74%)	46 (100%)
12	Gender-separated toilets	2 (4.35%)	4 (8.70%)	16 (34.78%)	20 (43.48%)	4 (8.70%)	46 (100%)
13	Waste bins in stalls	1 (2.17%)	3 (6.52%)	12 (26.09%)	20 (43.48%)	10 (21.74%)	46 (100%)
14	Handwashing facilities	0 (0%)	6 (13.04%)	14 (30.43%)	20 (43.48%)	6 (13.04%)	46 (100%)
15	Worship facilities	0 (0%)	2 (4.35%)	14 (30.43%)	23 (50%)	7 (15.22%)	46 (100%)
16	Wall cleanliness	1 (2.17%)	2 (4.35%)	17 (36.96%)	23 (50%)	3 (6.52%)	46 (100%)
17	Floor cleanliness	2 (4.35%)	1 (2.17%)	15 (32.61%)	24 (52.17%)	4 (8.70%)	46 (100%)
18	Aisle cleanliness & tidiness	1 (2.17%)	2 (4.35%)	17 (36.96%)	23 (50%)	3 (6.52%)	46 (100%)
19	Water adequacy	1 (2.17%)	3 (6.52%)	13 (28.26%)	25 (54.35%)	4 (8.70%)	46 (100%)
20	Toilet cleanliness	1 (2.17%)	4 (8.70%)	14 (30.43%)	22 (47.83%)	5 (10.87%)	46 (100%)
21	Waste disposal tidiness	2 (4.35%)	4 (8.70%)	14 (30.43%)	23 (50%)	3 (6.52%)	46 (100%)
22	Wastewater disposal	1 (2.17%)	4 (8.70%)	21 (45.65%)	15 (32.61%)	5 (10.87%)	46 (100%)
23	Ease of digital use (PEOU)	0 (0%)	5 (10.87%)	6 (13.04%)	17 (36.96%)	18 (39.13%)	46 (100%)
24	Usefulness of digital system (PU)	0 (0%)	3 (6.52%)	14 (30.43%)	16 (34.78%)	13 (28.26%)	46 (100%)
25	Intention to use digital system (BI)	0 (0%)	3 (6.52%)	9 (19.57%)	14 (30.43%)	20 (43.48%)	46 (100%)

Table 2. Traders' perceptions of hygiene, sanitation and digitalization at Oro-Oro Dowo Market, Malang

No	Market Aspect	Very Poor	Poor	Fair	Good	Very Good	Total
1	Market security	0	0	10 (21%)	28 (58.3%)	10 (20.83%)	48 (100%)
2	Parking area	0	1 (2.08%)	8 (17%)	27 (56.3%)	12 (25%)	48 (100%)
3	CCTV	0	3 (6.25%)	13 (27%)	17 (35.4%)	15 (31.25%)	48 (100%)
4	Thuggery	11 (22.92%)	16 (33.33%)	8 (17%)	11 (22.9%)	2 (4.17%)	48 (100%)
5	Theft	0	3 (6.25%)	23 (48%)	21 (43.8%)	1 (2.08%)	48 (100%)
6	Stall condition	0	1 (2.08%)	8 (17%)	24 (50%)	15 (31.25%)	48 (100%)
7	Trading space arrangement	0	0	9 (19%)	26 (54.2%)	13 (27.08%)	48 (100%)
8	Roof/ceiling condition	0	1 (2.08%)	12 (25%)	26 (54.2%)	9 (18.75%)	48 (100%)
9	Construction condition	0	1 (2.08%)	8 (17%)	27 (56.3%)	12 (25%)	48 (100%)
10	Trash bins in toilets	1 (2.08%)	0	15 (31%)	26 (54.2%)	6 (12.5%)	48 (100%)
11	Lighting	0	0	14 (29%)	28 (58.3%)	6 (12.5%)	48 (100%)
12	Male-female toilet separation	0	1 (2.08%)	17 (35%)	28 (58.3%)	2 (4.17%)	48 (100%)
13	Waste bins at each stall	0	2 (4.17%)	17 (35%)	23 (47.9%)	6 (12.5%)	48 (100%)
14	Handwashing facilities	0	7 (14.58%)	17 (35%)	20 (41.7%)	4 (8.33%)	48 (100%)
15	Worship facilities	0	0	11 (23%)	32 (66.7%)	5 (10.42%)	48 (100%)
16	Wall cleanliness	0	1 (2.08%)	7 (15%)	34 (70.8%)	6 (12.5%)	48 (100%)
17	Floor cleanliness	0	1 (2.08%)	7 (15%)	28 (58.3%)	12 (25%)	48 (100%)
18	Aisle cleanliness and tidiness	0	1 (2.08%)	12 (25%)	23 (47.9%)	12 (25%)	48 (100%)
19	Adequate clean water	0	0	24 (50%)	20 (41.7%)	4 (8.33%)	48 (100%)
20	Toilet cleanliness	0	1 (2.08%)	16 (33%)	28 (58.3%)	3 (6.25%)	48 (100%)
21	Waste disposal neatness	0	0	19 (40%)	24 (50%)	5 (10.42%)	48 (100%)
22	Wastewater drainage	0	1 (2.08%)	11 (23%)	30 (62.5%)	6 (12.5%)	48 (100%)
23	Ease of digital system use (PEOU)	0	3 (6.25%)	5 (10%)	27 (56.3%)	13 (27.08%)	48 (100%)
24	Usefulness of digital system (PU)	3 (6.25%)	0	16 (33%)	24 (50%)	5 (10.42%)	48 (100%)
25	Intention to use digital system (BI)	1 (2.08%)	3 (6.25%)	8 (17%)	22 (45.8%)	14 (29.17%)	48 (100%)

The parking facilities also received positive evaluations, being considered safe and well-organized. According to the survey, 50% of managers rated the parking area as “good” and 33.33% as “very good.” These perceptions were echoed by consumers, of whom 54.35% rated parking as “good” and 13.04% as “very good.” Traders also shared similar experiences, with 56.3% considering parking “good” and 25% “very good.” Observations confirmed these views, as the parking area is situated near the main entrance, allowing easier monitoring and reducing crime risks. The active role of parking attendants further enhances security by assisting visitors in finding spaces and preventing thefts of helmets or personal belongings.

Sanitation facilities also emerged as a strong aspect of the market’s infrastructure. The availability of trash bins in toilets, handwashing stations, and clean water was rated positively, with most respondents selecting “good” or “very good.” For example, 83.33% rated handwashing facilities and toilet cleanliness as “good,” while 66.67% noted that wastewater drainage and waste disposal areas were orderly. Such conditions align with the broader emphasis on hygiene standards, ensuring that both traders and visitors can conduct market activities comfortably in a clean environment. The provision of prayer facilities also received recognition, with 66.67% rating them as “good” and 16.67% as “very good,” demonstrating attention to the holistic needs of market stakeholders.

Digitalization, while less dominant compared to hygiene and sanitation, still shows encouraging progress. Regarding the ease of use of digital systems (PEOU), 33.33% rated it “good” and another 33.33% “very good.” Similarly, two-thirds of managers (66.67%) agreed that digital platforms are useful (PU), and one-third acknowledged strong intentions (BI) to continue adopting such systems. These insights indicate that although digital adoption is still in its early stages, managers recognize its benefits and are inclined toward its integration. Overall, the findings highlight that Oro-Oro Dowo Market, through balanced attention to physical conditions, security measures, and gradual digitalization, offers a conducive environment for sustainable market operations.

Table 3. Market managers’ perceptions of hygiene, sanitation and digitalization at Oro-Oro Dowo Market, Malang

No	Market Aspect	Very Poor	Poor	Fair	Good	Very Good	Total
1	Market security condition	0	0	1	16.67	2	33.33
2	Parking area	0	0	1	16.67	3	50.00
3	CCTV	0	0	0	0	2	33.33
4	Street thuggery	1	16.67	1	16.67	0	0
5	Theft	0	0	2	33.33	3	50.00
6	Stall condition	0	0	2	33.33	2	33.33
7	Trading space arrangement	0	0	1	16.67	3	50.00
8	Roof/ceiling condition	0	0	3	50.00	2	33.33
9	Construction condition	0	0	3	50.00	3	50.00
10	Availability of trash bins in toilets	0	0	1	16.67	5	83.33
11	Lighting condition	0	0	2	33.33	2	33.33
12	Separation of male and female toilets	0	0	1	16.67	4	66.67
13	Availability of trash bins in each stall	0	0	3	50.00	3	50.00
14	Availability of handwashing facilities	0	0	1	16.67	5	83.33
15	Worship facilities	0	0	1	16.67	4	66.67
16	Cleanliness of walls	0	0	3	50.00	3	50.00
17	Floor cleanliness	0	0	1	16.67	5	83.33
18	Cleanliness and orderliness of alleys	0	0	1	16.67	5	83.33
19	Availability of clean water	0	0	2	33.33	4	66.67
20	Toilet cleanliness	0	0	1	16.67	5	83.33
21	Orderliness of waste disposal area	0	0	2	33.33	4	66.67
22	Wastewater drainage	0	0	2	33.33	4	66.67
23	Ease of use of digital system (PEOU)	0	0	1	16.67	2	33.33
24	Usefulness of digital system (PU)	0	0	0	0	4	66.67
25	Intention to use digital system (BI)	0	0	1	16.67	2	33.33

3.2.4 Security, infrastructure and digital transformation: a comprehensive analysis of Oro-Oro Dowo Traditional market

The security landscape of Oro-Oro Dowo Market represents a sophisticated blend of traditional oversight and contemporary surveillance technology. Beyond conventional written regulations and human security personnel, the market has embraced modern security infrastructure through strategically positioned closed-circuit television (CCTV) systems. These surveillance devices serve a dual purpose: they function not merely as monitoring tools but as powerful deterrents against potential criminal activities including theft, fraud, and harassment. Survey findings reveal that both vendors and customers demonstrate heightened awareness of the CCTV presence, which has proven instrumental in creating a secure trading environment. Market management reports that these technological interventions have significantly reduced incident reports, with security personnel responding swiftly to the rare cases of theft or loss that do occur.

The persistent challenge of organized intimidation, commonly known as premanisme, which historically plagued many traditional markets across Indonesia, appears remarkably subdued within Oro-Oro Dowo's boundaries. Through comprehensive questionnaire responses and direct field observations, the research reveals an encouraging security climate where only minimal instances of intimidation or extortion persist. The market environment demonstrates orderly commercial activities, natural interactions between traders and customers, and notably absent territorial control by unauthorized groups. This peaceful atmosphere stems directly from the active collaboration between professional security staff and the comprehensive CCTV network, creating a protective umbrella that enables commerce to flourish without fear or coercion.

Stakeholder perceptions consistently reflect positive attitudes toward the market's security arrangements across all participant categories—visitors, vendors, and management personnel alike. The security framework at Oro-Oro Dowo transcends mere crime prevention; it encompasses systematic surveillance protocols, adequate supporting facilities, and collective adherence to established regulations by all community members. This harmonious integration of formal security measures with active participation from buyers, sellers, and administrators has successfully maintained the market's reputation as a safe and welcoming commercial space. Such comprehensive security management serves as an exemplary model for professional market administration while preserving the authentic character and cultural identity of traditional marketplace environments.

The physical infrastructure and supporting facilities at Oro-Oro Dowo Market have garnered widespread approval from the market community, with both vendors and visitors expressing satisfaction with various structural elements. These positive assessments encompass booth conditions, commercial space organization, leak-proof roofing and ceiling systems, and robust, secure building construction. Sanitation and cleanliness facilities have earned particular commendation, including strategically placed waste bins in restrooms, gender-separated toilet facilities, individual kiosk waste disposal systems, and adequate handwashing stations. The presence of well-maintained, clean prayer facilities further enhances user comfort while addressing the spiritual needs of the market community.

These overwhelmingly positive perceptions indicate that the market successfully meets most indicators outlined in the Healthy Market criteria established by Indonesia's Ministry of Health, encompassing basic sanitation, environmental cleanliness, and infrastructure supporting healthy living behaviors. Research by Pamungkas (2023) argues that markets meeting healthy market standards not only enhance visitor comfort but also promote hygienic behaviors, reduce environment-based disease risks, and strengthen the competitive position of traditional markets. Within this context, successful market management based on positive community perceptions serves as a benchmark for evaluating revitalization program effectiveness and promotional-preventive efforts in public health initiatives.

Direct field observations reveal nuanced realities regarding sanitation facilities, particularly handwashing stations, which while not available at each individual kiosk, are strategically positioned throughout the market area. These facilities maintain clean conditions with running water and hand soap, representing crucial indicators of public hygiene implementation. Although not universally accessible at every trading post, the strategic placement of handwashing facilities demonstrates market management's commitment to supporting clean and healthy living behaviors (PHBS), particularly in preventing environment-based disease transmission. The waste management system utilizes plastic baskets lined with plastic bags, facilitating easy disposal into larger covered, waterproof collection boxes distributed throughout the market, though systematic separation of wet and dry waste remains incomplete.

These findings align with research conducted by Odjegba et al. (2024), which emphasizes that basic sanitation infrastructure availability, including handwashing facilities and waste management systems, significantly influences healthy market status achievement. Furthermore, studies by Sitompul et al. (2023) confirm that waste management through collaboration between market managers, traders, and relevant agencies, as well as the enhancement of legal awareness and community behavior regarding cleanliness and waste management principles. Consequently, while several indicators have been satisfied, continuous improvement and ongoing guidance remain essential for the market to achieve comprehensive healthy market status.

Assessment variations emerge when examining building construction conditions and restroom waste bin availability, with most buyers and market managers rating these facilities as "adequate," suggesting that while primary functions remain operational, certain comfort or aesthetic deficiencies persist. Conversely, most vendors rate these aspects positively, likely due to their familiarity with market conditions and primary focus on functional rather than comprehensive physical comfort considerations. Regarding gender-separated toilet facilities, unanimous positive perceptions exist across all respondent groups—vendors, buyers, and market management—indicating successful implementation of basic sanitation principles in healthy market standards, particularly in providing gender-appropriate sanitation facilities as specified in the World Health Organization (2021).

Market cleanliness represents a fundamental indicator in achieving healthy market status according to Health Minister Decree No. 519/MENKES/SK/VI/2008, encompassing environmental sanitation, waste management facilities, and clean water availability. Research findings demonstrate that Oro-Oro Dowo Market's cleanliness generally falls within adequate to good categories, with varied assessments from buyers, vendors, and managers. Buyers (46% rating adequate, 40% good) appreciate main area cleanliness while noting deficiencies in open waste areas, uneven handwashing facility distribution, and suboptimal restroom conditions. This aligns with findings by Fikri & Prameswari (2024) that cleanliness perceptions directly influence shopping comfort and consumer engagement. Vendors demonstrate more positive perceptions (55% rating good, 30% adequate), viewing cleanliness as crucial for maintaining product reputation and sales comfort, though some note insufficient waste separation and handwashing facility cleanliness issues, consistent with Semarang research by Siswanto & Pertiwi (2023) indicating many traditional market traders still fail to meet sanitation standards.

The digital transformation journey of Oro-Oro Dowo Market exemplifies how traditional marketplaces can successfully embrace technological advancement while maintaining their cultural authenticity. The implementation of QRIS (Quick Response Code Indonesian Standard) represents a significant leap forward, following Bank Indonesia's Board of Governors Regulation No. 21/18/PADG/2019 on August 16, 2019, establishing national QR code standards for payment systems. This digital payment method enables buyers to conduct transactions quickly, securely, and conveniently without carrying large amounts of cash, reducing theft risks and enhancing security for both parties. Survey results confirm that most vendors and buyers find QRIS usage increases transaction practicality, supported by researcher observations showing widespread QR code adoption displayed strategically in individual kiosks. Beyond payment systems, digitalization opportunities extend to social media utilization and online marketplace platforms, with most vendors leveraging social media for product information, pricing, availability updates, and promotional activities. Many traders enhance sales through e-commerce and delivery services provided through collaboration between Malang City's KADIN UMKM and Bank BRI, expanding market reach and providing customer convenience for home-based shopping. Despite these advances, some vendors and buyers remain unable to optimize digitalization due to limited technological understanding and cash payment habits, though survey responses indicate widespread desire for enhanced digital utilization to expand market reach and competitiveness. This comprehensive digital integration positions Oro-Oro Dowo Market as a reference model for other traditional markets seeking to balance technological advancement with cultural preservation while improving shopping effectiveness and market competitiveness.

4. CONCLUSION

The findings of this study highlight that Pasar Oro-Oro Dowo has successfully implemented a series of innovations and development strategies through comprehensive revitalization and systematic facility improvements. These include structured zoning of stalls based on product categories, enhancement of public facilities such as spacious parking areas, clean toilets, prayer rooms, lactation rooms, handwashing stations, and the installation of CCTV to strengthen security. Safety is further supported by routine monitoring and collaboration among market managers, traders, and buyers, creating a secure and comfortable environment. Clean and healthy living behaviors are encouraged through the provision of handwashing facilities, although their distribution is not yet evenly available at every stall. In addition, digital systems are beginning to be adopted, receiving positive responses from both visitors and managers. These innovations not only improve perceptions of market cleanliness, comfort, and security but also foster greater trust and satisfaction among traders and buyers, potentially increasing trading activities and supporting inclusive and sustainable local economic growth. Nevertheless, challenges remain in maintaining consistent cleanliness, optimizing waste management, reducing elements of premanisme, and ensuring broader adoption of digital technologies. Despite this, the strong commitment of stakeholders and government support provides an opportunity for this market model to serve as a replicable example for other traditional markets in achieving the long-term vision of Indonesia Emas 2045.

Based on these findings, several recommendations can be put forward. Traders are encouraged to add value to their traditional products through innovation while preserving their cultural identity. Market managers are advised to strengthen cleanliness and sanitation by ensuring wider distribution of handwashing facilities, conducting regular toilet maintenance, and providing sufficient covered trash bins. Waste separation between organic and non-organic materials should also be promoted to ease waste management. In terms of digitalization, training programs for traders and buyers on QRIS usage, online shopping systems, and the role of social media in marketing should be conducted regularly, supported by stronger internet infrastructure such as Wi-Fi access within the market. By adopting such strategies, other traditional markets across Indonesia can follow the example of Pasar Oro-Oro Dowo to become semi-modern markets that improve competitiveness, expand market reach, and foster sustainable local economic development.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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