



The Transformation Process of Chili Auction Market from Conventional to Digital in Kulon Progo Regency, Indonesia

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ABSTRACT

The digital transformation of auction market management plays a crucial role in addressing the high volume of chili peppers and mitigating potential inefficiencies and inaccuracies in operational processes. However, several challenges persist in implementing this transformation. Therefore, this study aimed to investigate the process of transitioning auction market management from conventional to digital. Using a descriptive qualitative methodology, insights were obtained from auction market managers representing five distinct groups in Kulon Progo Regency. Data collection methods included focus group discussions (FGDs), observation, and in-depth interviews. The results showed varying levels of readiness for digital adoption across the markets, with Tani Rejo Auction Market leading in digital technology utilization. Key factors influencing the pace and success of this transformation included institutional dynamics, leadership capabilities, and human resource preparedness. However, persistent farmers' perceptions regarding the potential adverse impacts of digital pricing on livelihoods remained a barrier. This study outlined a phased transformation process, comprising initial communication, goal setting, system analysis, implementation of digital applications, training, socialization, evaluation, and follow-up. In addition, support from stakeholders, particularly the Agriculture Office and Bank Indonesia (BI), was identified as crucial in facilitating farmers and traders through the digitalization process, typically improving market efficiency and benefiting all stakeholders.

INTRODUCTION

The transformation process of chili auction market from conventional to digital in Kulon Progo Regency

presents a compelling research topic, as this shift not only involves technological advancements but also influences market value chains, farmers' welfare,

and market accessibility. With the rapid development of information and communication technology, Indonesia's agricultural sector has increasingly adopted digitalization to improve marketing efficiency and effectiveness. One of the initiatives to address the issue of price gaps is establishing an auction market to reorganize value chains (Jamhari et al., 2022).

Kulon Progo Regency, one of the leading chili-producing districts in the Special Region of Yogyakarta (DIY), recorded significant production levels in 2022. According to BPS data, chili production in the regency reached 308,503 tons for keriting and 6,500 tons for cayenne (BPS, 2023). The average daily transaction value from chili auctions reached Rp. 652.98 million. Given this high volume of production and turnover, effective management of auction market operations is essential. The auction market serves as a crucial component of the agribusiness value chain, offering farmers easier access to competitive pricing and local sales channels. This institution has proven beneficial for all parties involved, enabling farmers to sell products in large quantities at favorable prices while also strengthening the existence of farmer groups (Nugroho, 2021).

A conventional auction market is a marketing mechanism for agricultural products where transactions occur directly between sellers and buyers at a physical location. In this type of market, prices are determined through a bidding or bargaining process in the

presence of other auction participants. The activities typically require physical attendance, are constrained by time, and involve multiple stakeholders, including farmers, traders, and auction organizers. Although conventional auctions promote price transparency, there are significant challenges in information access, time efficiency, and space constraints, particularly in the current digital era.

Kulon Progo Regency is known as one of the important places for chili production in Yogyakarta Special Region (DIY). However, there are both problems and chances when trying to use a digital auction market. Therefore, this study aimed to examine how the change is happening and what it means for people in the market. The auction market was made by farmer groups, and they use it to sell together (Rusdiyana, 2018). This auction market is very helpful for chili farmers because it helps their economic activities in the area. It is not too hard for farmers to do transactions at the auction market since not many people use it, and mostly it is just for farmer group members. Also, farmers and the auction market have strong trust in each other. Some good things about the auction market are that it makes sure products are good, the way prices are decided is clear, and transactions are easily carried out (Anisah et al., 2020).

The auction market was first managed in the old traditional way, but now it is getting more difficult because organizing auctions has become more complicated. The process has always been carried out

manually, and there are many problems, like it takes a lot of time and does not match well with new technology. In the beginning, the auction market used a very simple system, and people did it at their homes, mostly on terraces. Price bidding was carried out in the usual traditional way. In this regard, farmers would sell their goods to collectors using a box system. The auction managers took a box and moved it from trader to trader. After some time passed, they opened the box, and the trader who gave the highest bid was chosen as the winner and the result was announced to the public. Over time, because of improvements in technology, the auction system in Kulon Progo started changing, and now it is moving towards digital platforms and applications.

Agricultural auction markets offer numerous benefits, including transparent price discovery, improved trade efficiency, and higher commodity prices. However, several challenges remain, such as regulatory barriers, risk aversion, and structural limitations within the market (Nugroho, 2021; Samper et al., 2022; Wulansari et al., 2018). Emerging technologies like online auction systems and blockchain can further improve the efficiency, transparency, and security of these markets.

Technology-based management and administration offer a potential solution to facilitate operations, but the majority of auction markets have not been able to apply digital technology. Although an application has been

provided to support auction market activities, not all groups are willing to adopt the system. The social dynamics involved in this digitalization process, particularly the interactions among relevant stakeholders, require further investigation.

Farmer group-based auction market institutions in Kulon Progo Regency are managed with clear organizational structures and defined roles. However, institutional profiles vary depending on the specific conditions of each group (Raya, 2014), consequently affecting the productivity of the auction market. In general, the organizational roles can be described as follows, 1) The Chairman, responsible for coordinating auction market operations, 2) The Secretary, handling administration documentation, including agreements and official records, 3) The Treasurer, managing financial reports and the auction market balance sheet.

The role of the auction market in facilitating marketing functions is categorized into three main areas, namely the exchange function, the physical function, and the provision of infrastructure. Each function and the responsibilities of auction market managers are as follows (Rusdiyana, 2018), 1) Exchange Function. Focuses on transferring ownership rights from one party to another, ensuring transparency and fairness in transactions. 2) Physical Function. Includes logistical and operational tasks such as transportation, packaging, storage, warehousing, and processing to improve the economic value of agricultural products. 3) Provision of Infrastructure.

Comprises supporting services such as access to market information, communication facilitation, product collection, risk mitigation, standardization and sorting, and financing mechanisms.

Information technology plays a significant role in making the agricultural marketing chain short. Farmers now have an easier time selling and promoting their crops by using social media platforms (Nurlaela et al., 2020). Using information technology makes it a lot simpler to manage auction markets. For example, managers can easily talk to traders, set prices and pick the highest bid, even when the traders are not at the auction place. The role of information technology in agricultural business has been studied previously (Prayoga et al., 2019; Subejo et al., 2018). Some digital applications have been useful for farmers by helping with production, marketing support, and research tools (Raya et al., 2018).

In this study, the roles of information technology in developing auction markets are presented as follows, 1) Information Access. Technology lets farmers and managers find important things like pricing, marketing ideas, competition, and new networks for markets. 2) Communication. It makes it easier for people in groups to interact, for farmers to talk to auction markets, and also for auction markets. 3) Marketing Network Development. It helps auction markets grow by making more cooperation with different stakeholders, getting more

traders, hence there is better price competition, and working with banks and other organizations.

The level of information literacy among farmers in Kulon Progo has been stated to be quite good (Raya et al., 2017), which is a strong base for using technology in auction markets. But digitalization in agriculture still has some problems, such as sustainability, ineffective use of technology, and not having enough training or education. Farmers still have trouble selling their products because they do not have adequate knowledge and skills. There needs to be more discussion to fix the technical and social problems with using technology and making digital changes. Developing appropriate policies to ensure access to resources, support market development, and encourage sustainable innovation is essential in addressing these challenges (Fernando et al., 2023).

Regarding digital transformation, institutions are quite good at adjusting. Using modern ways of managing, techniques, and systems, while still keeping authority and pushing for new ideas, can help agricultural organizations work better (Alexandru, 2015). The goal of digital transformation is to make public services better and more effective, which usually makes people more satisfied (Mergel et al., 2019). Managing the auction market is carried out in both the old traditional way and with digital auction systems. Syam et al. (2023) stated that the auction process happens in three steps, namely before, during, and after the

auction. The way the auction price is decided is by using the first-price auction system, which people also call a closed auction. This method helps stop traders from working together unfairly and makes them compete more, hence they try to give the highest price to get chili from farmers. Because of the changes, the way the auction market works has also changed. Although several aspects have evolved with the introduction of digital systems, certain elements, like the pricing mechanism, remain consistent. This study offered significant academic value by examining the dynamics of transitioning auction market management from traditional to digital systems. Understanding the transformation pattern is essential for analyzing both the process of change and the challenges farmers face in accessing services within the auction market framework. The novelty of this study lies in its in-depth analysis of the transformation process, from conventional auction markets to digital platforms, including system

modifications, market participants' adaptation, and the integration of information technology to support auction transactions.

METHODS

This study was conducted from April to December 2023 in Kulon Progo Regency, Special Region of Yogyakarta (DIY) using a qualitative method. Out of the ten auction markets in the regency, one auction market was selected from each village, resulting in five auction markets being the main focus, namely Tani Rejo, Bangun Karya, Harapan Tani, Sidodadi, and Karang Wuni. Furthermore, the participants comprised auction market administrators, agricultural extension workers, and farmer representatives who were members of the respective farmer groups associated with each auction market.

Data were collected using observation techniques, focus group discussions (FGDs), and in-depth interviews, and subsequently analyzed through categorization, reduction

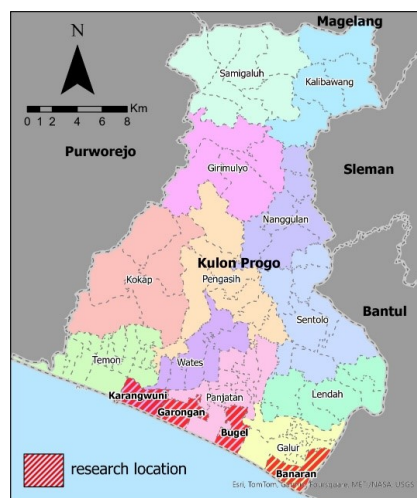


Figure 1. Map of auction market location

Table 1. Characteristics of the Auction Market in Kulon Progo

Aspects	Gisik Pranaji	Bangun Karya	Harapan Tani	Sidodadi	Tani Rejo
Year of standing	2000	2005	2012	2012	2019
Operating Hours	16.30-19.00	17.00-19.00	17.00-19.00	17.00-19.00	16.00-19.30
Head of Auction Market	Karman	Suradi	Didik	Ngatimin	Sholeh
Subdistrict-Village Payment system	Panjatan-Bugel I Payment reimbursed each night in advance by group treasury	Panjatan-Garongan Payment via bank transfer within 2 days after the auction	Panjatan-Bugel II Payment via bank transfer within 2 days after the auction	Galur-Banaran Payment via bank transfer within 2 days after the auction	Wates-Karangwuni Payment due within 3 days after price agreement
Financial Management	50% of auction proceeds for the group, 50% for management services	Monthly profit divided equally: 50% for labor, 50% for group	Monthly profit divided: 50% for board (investors) and auction group; 50% for labor (75%) and social activities (25%); each member has savings	50% of auction proceeds for the group, 50% for management services	50% of auction proceeds for the group, 50% for management services; deduction scale based on quantity: 11-30kg: 0.5kg, 31-60kg: 1kg, 61-80kg: 1.5kg, 81-100kg: 2kg
Use of digital technology	Manual	Semi-digital (via WhatsApp/SMS); digital trials underway	Semi-digital (via WhatsApp/SMS); digital trials underway	Semi-digital (via WhatsApp/SMS); digital trials underway	Digital, using Dipanen.id app

Source: Primary Data Analysis (2023)

and triangulation. Qualitative data analysis is the process of systematically searching for and organizing data obtained from interviews, field notes, and other sources in order to interpret information clearly and effectively communicate to others (Sugiyono, 2019).

RESULTS AND DISCUSSION

Characteristics of Chili Auction Market in Kulon Progo Regency

Chili production in Kulon Progo Regency reached 308,503 tons for keriting and 6500 tons for cayenne (BPS, 2023). The study focused on five auction markets, each representing a different village. The auction markets

included Tani Rejo, Bangun Karya, Harapan Tani, Sidodadi, and Karang Wuni, with their locations presented as follows Figure 1.

Based on Table 1, characteristics of the auction markets in Kulon Progo vary by location. The earliest established auction market was Gisik Pranaji, chaired by Mr. Sukarman. This was followed by Bangun Karya, Harapan Tani, and Sidodadi, each founded in the same year, and finally, Tani Rejo. Mr. Karman, an influential opinion leader, was the first to initiate chili cultivation in the coastal areas. In addition to pioneering chili farming, Mr. Karman also played a key role in establishing the first auction market. According to Matous (2023), opinion leaders are instrumental in driving change in agriculture and food systems.

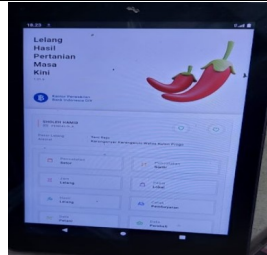
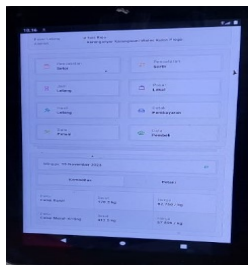
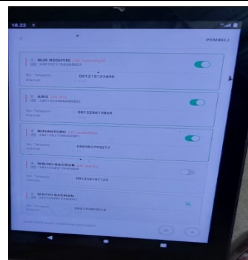
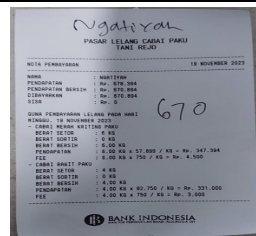
The originally traditional auction markets began transitioning to digital systems. Tani Rejo, the most recently established market, became the first to fully implement digital technology. Its manager had been highly proactive in networking with external stakeholders. Initially held on the terrace of a local resident's home, the Tani Rejo Auction Market received building assistance from the Agriculture Office in 2013 and later, rehabilitation support from Bank Indonesia (BI). This result was supported by (Samper et al., 2022; Wulansari et al., 2018), where capacity and human resources played a crucial role in the success of digital transformation processes. With strong communication skills and a forward-thinking, youth-driven

leadership team, Tani Rejo was able to transition from traditional to digital operations more rapidly than other markets.

All auction markets initially served farmers and auctioneers manually before shifting to semi-digital systems. On October 1, 2023, Tani Rejo officially became the first auction market in the region to operate using fully digital services. Despite being the last to be established (in 2019), it was the only market deemed fully prepared during a visit by representatives from the Central Ministry. Following a visit from the Secretary of the Director General of Horticulture, the Karang Wuni Auction Market was subsequently granted infrastructure support in the form of a dedicated auction space.

The digitalization process began with a series of socialization activities. These sessions were attended by all auction market groups, where participants were invited to express readiness to implement a digital auction system. Tani Rejo Auction Market was the first to volunteer for full implementation. Meanwhile, Gisik Pranaji I, Sidodadi, and Bangun Karya were still in the trial phase. Harapan Tani Auction Market had not adopted the system, citing greater comfort with the semi-digital model. Based on innovation adoption theory, delays in adoption often stemmed from farmers' hesitation to transition from familiar traditional systems to new technologies due to a lack of confidence in their success (Montes de Oca Munguia et al., 2021). In addition, group leaders significantly influenced

Table 2. Digital Auction Stages the Dipanen.id

Stages	Feature
Open the Tab menu, select the Dipanen id pro feature	
Clicked on the auction of today's agricultural products (below the BI logo)	
Top: Auction Market Identity / Address Menus: Recording (deposit) Auction hours Auction results Data (farmers) Logging (sorting) Market (local) Print (payment) Data (buyer) (All menus above when clicked will display the data in question.	
This is an example of a buyer data menu	
Print payment notes	

Source: (Euriga & Nurlaela, 2024)

the decision to adopt or reject technological changes (Ober, 2020). Digital transformation also required specific organizational structures and could impact the performance metrics

used to evaluate success (Verhoef et al., 2021).

The three auction markets that implemented digital systems reported ongoing challenges after the trial

phase. One key issue is the perception that digital pricing mechanisms tend to favor traders over farmers, particularly when chili supply is abundant. The Sidodadi Auction Market, in particular, has faced difficulties fully transitioning to digital due to its fragmented structure across several farmer groups, which complicates coordination efforts. Opinions on the digitalization process remain mixed, with some perceiving that prices offered through digital auctions are lower than those achieved through traditional methods. After the trial, all participating markets underwent an evaluation of the *Dipanen.id* digital application to assess its effectiveness and potential for full adoption.

The stages and features of digital auctions implemented at at Karang Wuni Auction Market in Table 2.

Differences between Digital and Traditional Auction Market Management

Digital transformation is a holistic strategy that moves organizations above simple digitalization, driving changes in culture, management, procedures, and overall organizational development. The results of digital transformation include, 1) reducing costs in the buying and selling decision-making process 2) implementing agile acquisition policies supported by policymakers, and 3) fostering human-centered design and development, including agile leadership and

Table 3. Comparison of Digital and Traditional Auction Market Management

Auction Market	Communication model	Price	Admistration	Auction Time
Traditional	Communication occurs through oral discussions (e.g., telephone) and photos, providing traders with a clear picture. The auction market can also promote and convince potential auctioneers	Pricing is carried out behind closed doors	Manual, time-consuming, and prone to errors	Auction time may extend a few minutes past the deal, allowing auctioneers to observe prices at other markets
Digital	There is no direct communication between farmers (sellers) and traders (buyers); hence, traders cannot assess the conditions of goods in advance. Farmers cannot see the auction price set, limiting the ability to compare with prices at other locations	Pricing is carried out behind closed doors with no communication	Auction results are immediately visible after the auction closes, eliminating the need for manual calculations	Auction closing time is strictly adhered to and cannot be extended

Source: Primary data analysis (2023)

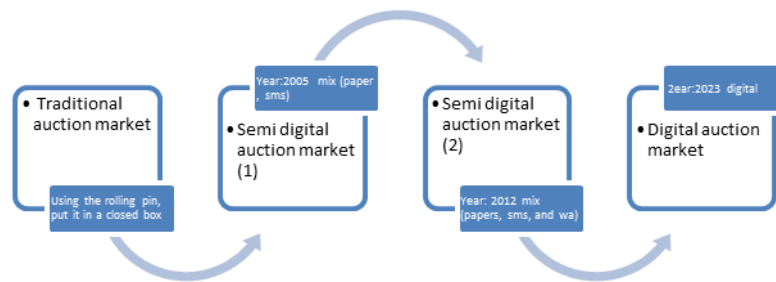


Figure 1. The traditional Auction Market running to digital (Research results analysis; 2024)

cultural change (Mergel et al., 2019). Traditional auction markets rely significantly on physical presence and manual processes, while online auctions leverage digital technologies to improve accessibility, efficiency, and dynamic participation. This transformation has significantly broadened the scope and scale of auction markets (Reis & Melão, 2023). Auction market management was carried out behind closed doors in both traditional and digital auctions. This was in accordance with (Sham et al., 2023). The auction mechanism was carried out in three stages, namely pre-auction, auction, and post-auction activities. Auction prices are determined using the first-price auction mechanism, also known as closed auctions. This mechanism minimizes collusion between traders and force traders to compete for chili supplies from farmers by offering the highest possible prices.

Digital Transformation in Auction Market Management

The auction market continues to undergo transformation over time. What was originally a traditional auction market is currently transitioning to a semi-digital model

and, eventually, fully digital. Out of the five auction markets, only one is fully digital, while the other four are still using semi-digital management, as shown in Figure 1. The semi-digital transformation process begins with SMS.

In general, three main theories were used to understand the adoption process (innovation diffusion theory, technological-organizational-environmental framework and institutional theory). These theories were collectively used to better explain the adoption process. In addition, there were three characteristics (innovation, enterprise, and environment) associated with risks and barriers in the adoption process (Yang et al., 2021). The process of adopting digital transformation innovations in chili auction activities in Kulon Progo Regency from the three theoretical perspectives is presented in Table 4.

Based on Table 4, auction market administrators and application providers established good communication and cooperation. Socialization was also carried out with farmers and traders, who would be directly involved in this change. Digitalization requires cooperation between stakeholders (Aerni et al., 2015). The ability to use

Table 4. Stages of Digital Technology Implementation Dipanen.id at Chili Auction Market in Kulon Progo Regency.

Stages	Parties involved	Technical Implementation	Output
Carry out initial communication regarding the importance of the chili digital auction market	Auction market manager, Agriculture Office, Bank Indonesia	Conduct meetings and communication related to the need for auction market development	Obtain information related to the potential development of the digital auction market. Map auction market readiness and funding capability from Bank Indonesia
Determine digital transformation goals and strategies	Auction market manager, application provider, Agriculture Office, Bank Indonesia	Discuss with auction market managers regarding the purpose of digitalization through meetings	Agreement related to the creation of a digital auction market application
Perform System and Process analysis	Application provider, Bank Indonesia	Identify systems and business processes to be implemented in digital transformation to determine what needs to be improved or changed	Cost estimation, application programming, data preparation for farmers, traders
Early implementation of digital applications	Application providers, merchant auction market managers	Testing by app makers, ensuring that business processes run smoothly and are user-friendly	Auction market managers are familiar with the Dipanen.id application
Training and adaptation	App providers, auction market managers, traders	Training for auction market managers. In addition, an adaptation process is needed in digital transformation	Auction market manager is able to operate the Dipanen.id application
Socialization to Farmers Members of the Auction Market	Farmer, Auction market manager	Delivery of information related to digital auctions, benefits, and convenience obtained	Farmers and traders receive a digital auction model based on mutual commitment
Application Usage	Farmers, auction market managers, traders	Use of digital auction applications based on good group management	Managers and traders conduct digital auctions in accordance with the rules
Measuring and Evaluating the End.	Farmers, auction market managers, traders	Measure whether the transformation was successful or not	Users provide responses regarding application use
Follow-up	App builder	Continuously improve the development of technological innovation	The application becomes more refined, and users experience greater ease and advancement

Source: Primary data analysis (2023)

Table 5. Comparative Analysis of Auction Market Groups of Digital-Transition and Traditional Transformation Users

Aspects	Traditional	Transition	Digital
Institutional	Lack of clarity of targets and objectives	Have clarity of targets and objectives, but tend not to be implemented	Have clarity of targets and objectives.
Leadership	Chairman/opinion leader as central to change	Chairman/opinion leader as central to change	Chairman/opinion leader as leader collaborator
Human Resource	Old age Lack of understanding of ICT Less sure of the advantages of using ICT	Age is still relatively young, but still reluctant to change	Young and senior thinking about regeneration

Source: Primary data analysis (2023)

information technology is essential for ensuring that the digital auction market management runs smoothly. Auction market managers are required to operate the pro harvested applications, ensuring that auction process proceeds efficiently. The process can be faster when the users are proficient in operating Android phones.

Table 5 compares traditional, semi-digital, and digital auction markets from the perspective of institutional theory (Yang et al., 2021). Traditional auction market institutions tend to be centralistic, lacking clarity of vision, mission and objectives, while modern management models emphasize achievements based on clear planning, implementation, and evaluation. Alexandru, (2015) stated that management refers to the methods used for solving problems arising from management functions and driving the activities of the organizational components. The application of modern management

systems, methods and techniques that allow the involvement of execution personnel in managerial actions, without violating the principles of authority and promoting innovation, can influence management styles, instill a democratic character, and benefit farm performance.

Reis & Melão, (2023) stated that organizations fail to make changes when leaders do not pay enough attention to change management. This has a negative impact on the company's HR, making subsequent changes more difficult to implement. For the auction market to change, it should improve institutional management to be modern, dynamic, and have clear targets. Economic benefits have already been felt by members in all facilities, both in terms of transactions and service efficiency. However, there is still some reluctance regarding pricing through digital technology-based management. The issue needs to be communicated to all farmers, emphasizing that digitalization can offer significant profitability.

CONCLUSION AND SUGGESTION

In conclusion, Tani Rejo auction market was the first auction market ready to implement digitalization in its auction activities. This achievement could be attributed to the support of institutional, leadership, and HR aspects. The digital transformation process transcended several stages, namely initial communication regarding the importance of the digital chili auction market, determination of digital transformation objectives and strategies, system and process analysis, early implementation of digital applications, training and adaptation, socialization to auction market member farmers, application usage, and follow-up. Therefore, the Agriculture Office and BI were expected to continue assisting farmers, ensuring that auction market digitalization process improved, benefiting both farmers and traders.

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