

# Content in digital transformation application in management and development of key agricultural products in VO Nhai district, Thai Nguyen province by 2025, with a vision to 2030

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## ABSTRACT

In the context of digital transformation becoming increasingly crucial in various economic and social sectors, this study focuses on the application of digital transformation in the management and development of key agricultural products in Vo Nhai district until 2025, with a vision towards 2030. The article introduces the concept of digital transformation and its strengths in the agricultural sector. An overview of the digital transformation situation in Vietnam, as well as in Thai Nguyen province and specifically in Vo Nhai district, is presented to provide context for the study. The research methodology combines literature analysis and field research, with data collected from various sources such as official reports, community surveys, and expert interviews. The main content of the study focuses on the application of information technology and artificial intelligence in crop management, enhancing connectivity in the supply chain, and developing digital solutions tailored to local conditions. The expected outcomes of the study are specific recommendations to support decision-making and promote digital transformation in agriculture in Vo Nhai district, contributing to the sustainable development of the region and improving the quality of life for local residents.

**Keywords:** digital transformation, agriculture, key agricultural products, Vo Nhai.

## I. INTRODUCTION

The Fourth Industrial Revolution (Industry 4.0) has commenced in recent years and continues to advance vigorously. It is understood as a revolution in smart manufacturing based on breakthroughs in information technology,

biotechnology, nanotechnology, with the foundation being digital technology. To successfully execute this revolution and avoid falling behind, governments worldwide and Vietnam in particular must undertake "Digital Transformation." Considering the implementation perspective of Industry 4.0, it involves the integration of: The Internet of Things (IoT) platform; Information Technology (IT) and Artificial Intelligence (AI); Scientific and technological workforce to meet new requirements; Cloud computing; Big Data; Material technology; Biotechnology; Mechanical engineering, and automation.

In Vietnam, digital transformation in state management agencies and various sectors has begun but has not been comprehensive, widespread, or standardized. Governments at all levels have been developing e-government/e-administration. Some provinces/localities have started building and issuing digital transformation projects/plans based on Decision 749/QD-TTg approving the "National Digital Transformation Program by 2025, towards 2030" to implement Resolution 52-NQ/TW of the Politburo and Resolution 50/NQ-CP. Recently, the Prime Minister issued the National Strategy for Industry 4.0 until 2030 under Decision No. 2289/QD-TTg dated December 31, 2020, the National Strategy for Research, Development, and Application of Artificial Intelligence until 2030 under Decision No. 127/QD-TTg dated January 26, 2021, and the Strategy for Developing e-Government towards a Digital Government for the period 2021-2025, aiming towards 2030.

The National Digital Transformation Program by 2025, towards 2030 focuses on

implementing digital transformation on three pillars: Digital Government, Digital Economy, and Digital Society, and 08 priority areas including healthcare; education; finance and banking; agriculture; transportation and logistics; energy; resources and environment; and industrial production; defining 05 groups of tasks, solutions to lay the foundation for digital transformation (including: Awareness transformation; Institutional construction, Digital infrastructure development; Digital platform development; Cybersecurity; International cooperation, research, development, and innovation) and tasks, solutions for the development of Digital Government, Digital Economy, Digital Society, and 08 priority areas; while setting major goals for the digital government, digital economy, and digital society. The application of digital technology in agricultural production is implemented and applied through two methods:

- Application in the field, digital transformation helps farmers manage environmental conditions, growth conditions, and the health of crops and livestock through collecting, analyzing, monitoring, automatically adjusting, or automatically selling agricultural data such as humidity, temperature, soil quality, water, and disease. Based on quantitative data, farmers can make accurate decisions on planting, breeding to increase productivity, profitability, reduce costs, and improve product quality instead of relying solely on traditional empirical farming experiences. The application of digital technology in the field is often known by terms such as: Smart Agriculture/Farming; High-Tech Agriculture; Precision Agriculture/Farming.
- Application outside the field, digital transformation helps farmers connect directly with retailers, customers, and relevant parties in the product chain without the need for intermediary traders. On one hand, digital technology enables businesses and farmers to forecast agricultural output for purchasing and consumption planning. On the other hand, farmers can forecast market demand to plan production, avoiding oversupply situations. Additionally, digital technology makes information transparent in the agricultural production process to customers, thereby building trust in product quality and increasing product value. Moreover, the use of e-commerce platforms for promoting and selling agricultural products is becoming increasingly popular in Vietnam.

This study was conducted in Vo Nhai district, Thai Nguyen province. The Provincial Party Committee of Thai Nguyen issued Resolution No. 01-NQ/TU on the Provincial Digital Transformation Program for the period 2021 - 2025, towards 2030. Simultaneously, the Thai Nguyen Provincial People's Committee issued Plan No. 100/KH-UBND on the implementation of the "Program to promote the development and use of national digital platforms serving digital transformation, digital government, digital economy, and digital society" in Thai Nguyen province. The Vo Nhai district party committee issued an Action Plan to implement Resolution No. 01-NQ/TU on the Provincial Digital Transformation Program for the period 2021 - 2025, towards 2030. It identifies key tasks for various sectors, including administrative reform and agriculture. This article focuses on presenting the contents of the digital transformation research in the management and development of key agricultural products in Vo Nhai district.

## II. METHODOLOGY

### Information gathering method

- Collection of secondary documents: Gathering information from relevant specialized units of Thai Nguyen province, Vo Nhai district, and 5 communes/wards of this district.
- Collection of primary data: Investigating data on the current awareness and digital transformation process of relevant subjects conducted twice.
- Survey area: communes of Dinh Ca, La Hien, Trang Xa, Lau Thuong, Phu Thuong in Vo Nhai district.
- Target subjects: Farmers; Enterprises/Cooperatives; People's Committees of districts/communes/wards, specialized agencies.
- Sample survey scale: (1) Farmers: 10 farmer households/village × 4 villages/commune × 5 communes = 200 questionnaires. (2) Enterprises/Cooperatives: 30 questionnaires. (3) People's Committees, specialized agencies in the district/communes/wards: 45 questionnaires.

Applying the Participatory Rural Appraisal (PRA) method involving both community members and experts, combining both qualitative and quantitative data collection methods. Using the Semi-Structured Interview (SSI) technique and the snowball method to maximize the extraction of relevant information

regarding the current status of digital transformation in agriculture in Vo Nhai district.

#### Information analysis method

- Synthesis method: Summarizing information.
- Descriptive statistical method: Describing information.
- Comparative method: Comparing information.
- SWOT analysis method: Analyzing strengths, weaknesses, opportunities, and threats.
- Expert method: Consulting with experts.
- Training method: Training sessions.
- Inheritance method.

### III. RESEARCH CONTENT

#### 1. Scientific research content

##### 1.1. Evaluation of the current status of digital transformation in the management and development of agriculture in Vo Nhai district

- Collecting secondary information and documents to synthesize/analyze an overview of the digital transformation process in agricultural management in Vo Nhai district (Information technology infrastructure; Human resources; Land; Investment capital sources; Agricultural database systems...). Implemented in communes/wards including Dinh Ca, La Hien, Trang Xa, Lau Thuong, Phu Thuong of Vo Nhai district, Thai Nguyen province.
- Developing a survey questionnaire to assess the awareness and digital transformation process of relevant subjects including: People; Enterprises/Cooperatives; State management agencies. The expected survey content includes: Current situation; Impacts; Role of digital transformation; Digital applications; Challenges; Bottlenecks; Other opinions.
- Conducting field surveys: (i) Trial surveys through direct interviews combined with direct investigations to adjust survey questionnaires to fit the content and objectives of the topic. (ii) Conducting formal surveys to collect feedback from relevant parties as a basis for evaluating the current status of digital transformation.
- Survey scope: communes of Dinh Ca, La Hien, Trang Xa, Lau Thuong, Phu Thuong in Vo Nhai district.
- Survey subjects: Farmers; Enterprises/Cooperatives; People's Committees of districts/communes/wards, specialized agencies.
- Survey sample size: (1) Farmers: 10 farmer households/village  $\times$  4 villages/commune  $\times$  5 communes = 200 questionnaires. (2)

Enterprises/Cooperatives: 30 questionnaires. (3) People's Committees, specialized agencies in the district/communes/wards: 45 questionnaires. Survey period: 05 days, involving 06 staff members conducting field surveys in the identified areas.

#### Data processing, analysis, and evaluation

The research team will undertake the processing of survey data, investigative statistics, and analysis of survey results. Utilizing both actual survey results and secondary literature research, the team will evaluate and analyze digital transformation activities in Vo Nhai. This comprehensive report will detail the current status of digital transformation in agricultural management and the application of digital technology supporting the development of key agricultural products in the communes/townships of Vo Nhai district.

##### 1.2. Digital transformation in agricultural management and the production, processing, and consumption processes of agricultural products in Vo Nhai District

\* Digital transformation research in agricultural production:

The study will focus on digital transformation in the monitoring of pest diseases in pomelo trees. The supporting software system will have the capability to remotely control monitoring stations, observe crops in real-time, capture high-resolution images of crops (automatically or manually), display supportive information retrieved from the stations, and store images and videos to serve the monitoring of the growth and development process of pests and diseases.

\* Digital transformation research in agricultural processing:

Research will be conducted on digital transformation in the processing of longan fruit in Vo Nhai. This system will enable automation of drying based on pre-set temperatures, establishment of automatic or manual process procedures, monitoring of temperature and drying status on-site or remotely, and assurance of uniformly high-quality dried products.

\* Digital transformation research in agricultural product consumption:

Research will focus on the digitalization of e-commerce applications for the consumption of na fruit products through internet-based sales software. This software will manage sales, product pricing on cloud platforms, revenue management,

business activities on mobile phones and computers, inventory management, fund receipts and payments, detailed cash flow reporting, and employee role management with high customizability.

\*Conference organization:

The proposed theme of the conference is "Assessment of Potential, Opportunities, and Challenges in Agricultural Management and the Production, Processing, and Consumption Processes of Typical Local Agricultural Products." The event is scheduled for one session in September 2024 in Vo Nhai district, with an estimated attendance of 50 participants. The target audience includes scientists, policy planners (at central, provincial, and district levels), specialized agencies and departments (in Thai Nguyen province and Vo Nhai district), farmers, cooperatives, enterprises, and other relevant stakeholders.

### **1.3. Development and application of digital applications in agricultural product development**

\* Development of digital maps for concentrated production areas of key crops (custard apple, longan, pomelo):

Digital maps will be constructed for concentrated production areas of key crops (custard apple, longan, pomelo) with specific information updated and displayed on the map such as location, GPS coordinates, boundary range, images of production areas, land adaptability data for various crops, weather alerts, pest and disease notifications, seasonal schedules, and cultivation advice for farmers/cooperatives/enterprises.

\*Development of technology applications to meet digital transformation requirements:

The selection will be made to develop digital transformation applications through exemplary research on the system "Management and control of remote pomelo pest monitoring stations operating on the Internet environment." The supporting software system will have the capability to monitor and control monitoring stations remotely, observe crops in real-time, capture high-resolution images of crops (automatically or manually), display supportive harvest information from the stations, and store images and videos to serve the monitoring of the growth and development process of pests and diseases.

The personnel involved and equipment/material requirements are detailed in the

accompanying appendices. A pilot model study will be conducted at a 500m<sup>2</sup> pomelo-growing household in Trang Xa commune, involving the construction of an automated monitoring system for 500m<sup>2</sup>, including monitoring stations and monitoring station control boxes, soil moisture sensors, soil pH sensors, internet data transmission modules, station control modules and accessories, and monitoring and control software. The software system for managing and controlling remote pest monitoring stations for pomelo trees will operate on the internet environment, with functions including remote monitoring of soil pH and moisture parameters, storage and processing of images and videos collected from raw material cultivation areas to serve monitoring and tracking of pest and disease growth and development processes, storage, processing, and management of information related to pests and diseases to assist managers, scientists, and farmers in using information, user-friendly interface design facilitating quick and convenient data entry and retrieval operations, compatibility with popular smart devices such as PCs, laptops, tablets, and mobile phones, access through various web browsers, and ensuring safety and security at multiple levels such as network level, user authentication level, and database level, with user tracking functionality.

Organization of Training Workshops for Implementing Technology Applications to Meet Digital Transformation Requirements Appropriate to the Needs of Farmers, Cooperatives, and Enterprises in Agricultural Product Areas (custard apple, pomelo, longan) in Vo Nhai District

The workshop content will focus on technology application training in digital transformation in agricultural product areas (custard apple, pomelo, longan) in Vo Nhai district. The workshop is scheduled for two days in November 2024 in Vo Nhai district, with an estimated audience size of 50 per class and three classes. The target audience includes officials from specialized agencies, farmers, cooperatives, and enterprises in Vo Nhai district.

### **1.4. Development and expansion of e-commerce for agricultural products**

\*Construction and development of e-commerce channels for agricultural products:

The establishment of an electronic commerce (e-commerce) platform for agricultural products, conducting agricultural product sales on e-commerce platforms, and providing training on the utilization and management of e-commerce platforms.

\*Building and designing a website to promote agricultural products in Vo Nhai district:

The creation of content and design for a specific domain website promoting agricultural products in Vo Nhai district. Determining website features including product introduction, product information and images, contact details, and activity images. Defining interface requirements such as color schemes, layout, and content.

\*Development of an e-commerce platform for agricultural products in vonhai district:

Utilizing the agricultural product website of Vo Nhai district to integrate with major e-commerce platforms currently possessing large customer bases: Shopee, Lazada, Tiki, Sendo, and so on.

\*Organization of training workshops:

(i) Training on knowledge and guidance for registering stores on e-commerce platforms. Expected participation of 100 individuals divided into 2 classes, each with 50 participants. Location: Vo Nhai district; Duration: 1 day/class, May 2025. Target participants: farmers, cooperatives, and enterprises in Vo Nhai district. (ii) Training on agricultural product website management and transfer of management rights to district People's Committee officials. Expected participation of 50 individuals; Location: Vo Nhai; Duration: 1 day, on May, 2025.

### 1.5. Compilation of digital transformation handbooks for the management and development of agricultural products in Vo Nhai district

Compiling handbooks on digital transformation for the management and development of agricultural products in Vo Nhai district, focusing on the management and development of key agricultural products in Vo Nhai district by 2025, with a vision to 2030. The proposed content includes:

- Basic knowledge of digital transformation.
- Knowledge of digital transformation for individuals/businesses/state management agencies and the benefits of digital transformation.
- Knowledge of digital technology applications for agricultural management/agricultural products.
- Knowledge of digital technology applications for agricultural product development

(production, processing, consumption, e-commerce).

- Information security in digital technology applications for agricultural business activities.

### 2. Impact and benefits of research results

\*For relevant scientific and technological fields:

This scientific and technological field task is not only a scientific and technological endeavor that systematically addresses issues related to the theory of digital transformation in agriculture today but also clearly identifies and analyzes the current status of digital transformation associated with key products for a specific locality, while also addressing lessons learned in this field. Particularly, the value of this task lies in developing suitable digital transformation applications for key products (custard apple, pomelo, longan) in Vo Nhai district.

Therefore, in a context where scientific and technological literature related to the task is limited, this will be a scientific and technological work with high scientific content and quality. This implies that the task will become a valuable reference document in related fields.

\*For leading organizations and applied research institutions:

- The project will serve as evidence of scientific capacity for the leading organization.
- The products of the task will become communication tools for the successful application of digital transformation based on the application of research results. This will have a strong ripple effect on the application capacity of digital transformation for products/key product groups at the local level.
- Particularly, for the key product areas (custard apple, pomelo, longan) exploited in the task, this will lead to the development of related sectors such as tourism, training, and so on.

\*For socio-economic and environmental aspects:

This scientific and technological task aims to generate income for the people through the strong application of digital transformation today. Therefore, besides increasing revenue from the efficient production, processing, and consumption of key products (custard apple, pomelo, longan) in Vo Nhai district, the task will effectively instill pride in the local people for these products, leveraging the comparative advantages of the land, natural conditions, and the hard work of the local labor force. Particularly, through the digital transformation application for key products (custard apple, pomelo, longan), it will build a

widespread image and brand of agricultural products in domestic and international markets.

The application of digital transformation for 3 products will help increase income for people/cooperatives/enterprises, thereby contributing to improving people's lives. Simultaneously, it will contribute to increasing revenue from product sales through digital transformation applications, especially in the consumption process. The task's goal is built and developed on the fundamental principle that all stages of digital transformation in agriculture involve broad participation from all community members and local resources to serve agricultural development. Moreover, with the principle that the digital transformation application will be responsible and effective, the task's effectiveness will not only be limited to economic-cultural-social aspects but also have the feature of preserving environmental sustainability.

#### IV. CONCLUSION

The digital transformation in managing and developing key agricultural products in Vo Nhai district by 2025 and the vision to 2030 is an important factor in enhancing production efficiency, management, and market access for the agriculture sector. Through the introduction of digital transformation, we have discussed the digital transformation context in Vietnam in general and Thai Nguyen as well as Vo Nhai specifically.

The proposed research methods to carry out this task include a combination of desk research and field research. In-depth analysis of data from various sources such as official reports, community surveys, and expert interviews is necessary to better understand the current situation and challenges in the digital transformation process. The main content of the task will focus on the application of information technology and artificial intelligence in agricultural management, enhancing connectivity among stakeholders in the agricultural supply chain, and building digital solutions suitable for local conditions. The expected results of this research are to provide specific and practical recommendations for Vo Nhai district to promote digital transformation in managing and developing agricultural products, thereby contributing to increasing productivity, quality, and value-added for the agricultural economy as well as improving the lives of local people.

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