

An Information System for Surveying Digital Transformation Readiness of Small and Medium Enterprises In An Giang Province

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Abstract

This study outlines the development of an information system to survey the digital transformation readiness of enterprises in An Giang Province. The system aims to assess current digital capabilities, identify gaps, and provide actionable insights for improvement. It involves engaging key stakeholders and developing a comprehensive survey focusing on digital strategy, technology infrastructure, skills, automation, data management, and innovation. The system features a user-friendly interface, secure data handling, and analytical tools for effective data collection and reporting. The collected data is analyzed to produce detailed insights, which are then used to create tailored recommendations and action plans for businesses. The initiative seeks to enhance digital transformation among local enterprises, fostering economic growth and competitive advantage in the region.

Keywords: Digital Transformation, Readiness Assessment, Information System, An Giang Province, Enterprise Survey

INTRODUCTION

Digital transformation is an inevitable trend in the digital age, having a profound impact on all aspects of social life, including business activities of enterprises [1]. Recognizing the importance of digital transformation, many businesses, especially small and medium-sized enterprises (SMEs), have been actively implementing solutions to apply digital technology in their production and business activities.

The rapid advancement of digital technologies has fundamentally transformed business landscapes across the globe. Enterprises are increasingly recognizing the imperative to adopt digital transformation strategies to stay competitive, enhance operational efficiencies, and meet evolving customer expectations. In this context, the readiness of enterprises to embrace digital transformation becomes a critical factor determining their success in a highly dynamic market environment.

An Giang Province, a key economic region in Vietnam, is home to a diverse array of enterprises spanning various sectors, including agriculture, manufacturing, and services. Despite the growing awareness of digital transformation's benefits, there is a notable disparity in the readiness and capability of these enterprises to effectively implement and leverage digital technologies. Understanding the current state of digital transformation readiness among local businesses is essential for devising targeted interventions and support mechanisms.

This study aims to develop an information system to systematically survey and assess the digital transformation readiness of enterprises in An Giang Province. By engaging key stakeholders such as local government, business associations, and enterprise representatives, the study seeks to capture a comprehensive picture of the digital landscape. The information system is designed to facilitate efficient data collection, secure data management, and robust analysis, providing valuable insights into the digital readiness levels, challenges, and opportunities faced by enterprises.

The survey focuses on key dimensions of digital transformation, including digital strategy and leadership, technology infrastructure, digital skills and competencies, process digitization and automation, data management and analytics, and innovation and digital culture. By analyzing the collected data, the study aims to identify gaps and provide actionable recommendations to enhance the digital capabilities of local enterprises.

Ultimately, this initiative aspires to foster a digitally empowered business environment in An Giang Province, driving economic growth and competitive advantage through enhanced digital transformation readiness. The

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findings and recommendations from this study will serve as a vital resource for policymakers, business leaders, and other stakeholders committed to advancing digital innovation and resilience in the region.

RELATED WORKS

The study of digital transformation readiness has garnered significant attention in recent years, reflecting the critical importance of this topic in the modern business landscape. Various researchers have explored different aspects of digital transformation, providing valuable insights and frameworks that inform this study.

Digital Transformation Frameworks

Several frameworks have been proposed to assess digital transformation readiness. For instance, the Digital Transformation Assessment (DTA) framework by [2] emphasizes the role of digital capabilities, such as customer engagement, operational processes, and business models, in driving transformation. Similarly, the Digital Maturity Model (DMM) developed by [3] provides a comprehensive approach to evaluate an organization's digital maturity across dimensions like strategy, culture, technology, and operations.

Sector-Specific Studies

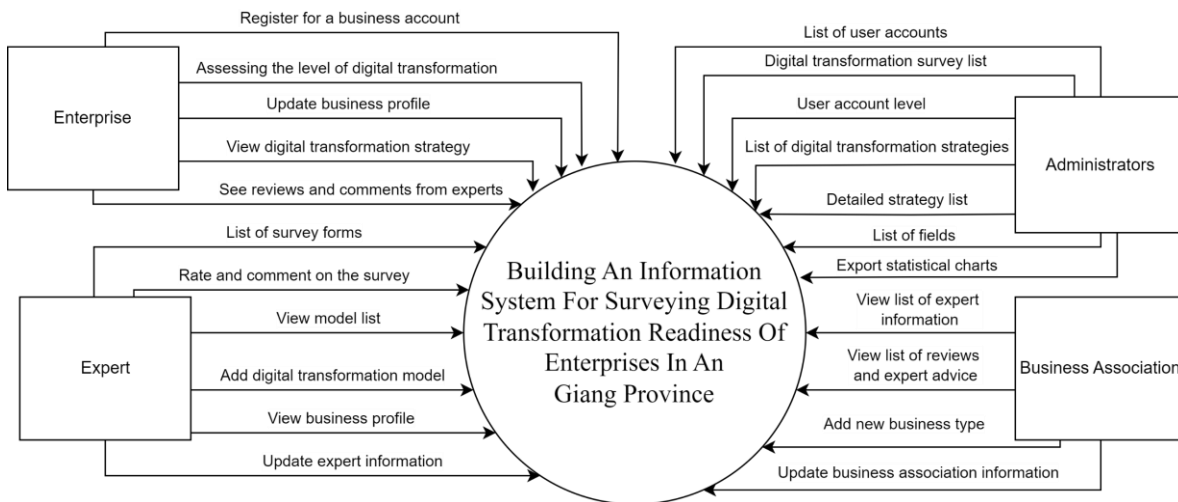


Figure 1: Overview of our system

Research has also focused on specific sectors to understand digital transformation challenges and readiness. In the manufacturing sector, studies by the authors of [4] and [5] highlight the integration of Industry 4.0 technologies and the readiness of enterprises to adopt advanced manufacturing technologies. In the agricultural sector, digital transformation readiness has been explored by the authors of [6], who examine the adoption of digital tools and technologies to improve agricultural productivity and sustainability.

Regional and National Assessments

Numerous studies have assessed digital transformation readiness at regional and national levels. For example, the European Commission's Digital Economy and Society Index (DESI) provides an annual assessment of digital performance across EU member states, focusing on connectivity, human capital, use of internet services, integration of digital technology, and digital public services. In a similar vein, the ASEAN Digital Integration Index (ADII) by the ASEAN Secretariat [7] evaluates digital integration readiness across ASEAN countries, emphasizing infrastructure, digital skills, and regulatory frameworks.

METHODOLOGICAL APPROACHES

The methodological approaches used in digital transformation readiness studies vary widely. Quantitative methods, such as surveys and statistical analysis, are commonly employed to collect and analyze data on digital

capabilities and readiness. For instance, the authors of [8] used a large-scale survey to examine the relationship between digital maturity and financial performance. Qualitative methods, including case studies and interviews, are also utilized to gain deeper insights into organizational practices and challenges related to digital transformation, as demonstrated by studies like those of [9].

Technological and Cultural Factors

Studies have also emphasized the importance of both technological and cultural factors in digital transformation readiness. The authors of [10] argue that successful digital transformation requires not only advanced technologies but also a supportive organizational culture and leadership commitment. This dual focus on technology and culture is echoed in the work of [11], who explore how digital leadership influences transformation initiatives.

The Digital Transformation Survey Dataset

We conducted a business survey based on a set of 4 questionnaires: Survey Form 01 - Aggregating information on the digital transformation index assessment of enterprises, Survey Form 02 - Digital transformation of small and medium-sized enterprises (SMEs), Survey Form 03 - Barriers to digital transformation in SMEs, and Survey Form 04 - Enterprises' opinions on digital transformation.

Process of System Analysis and Design

We are in the process of developing a digital transformation readiness assessment framework for small and medium enterprises (SMEs) in An Giang province. The process involves gathering survey data on digital transformation readiness and business information from SMEs. We then analyze this data to establish a structured approach for assessing digital transformation readiness. Additionally, we are constructing a website with functionalities for conducting surveys, gathering expert feedback, and managing digital transformation strategies.

Criteria for Digital Transformation Readiness

The digital transformation readiness of businesses in An Giang province can be assessed based on several key criteria: understanding customer needs, behaviors, and expectations; the ability to establish and track relevant data indicators; the application and innovation of technology to ensure seamless information flow; a clear and strong digital transformation strategy; the degree of digitization in operational processes to optimize activities and enhance competitive advantage; and a cohesive corporate culture that integrates cultural, human, structural, and task elements. To achieve success in digital transformation, businesses must have specific plans, strong commitment from leadership, and alignment across all activities.

Relevance to the Current Study

This study builds on the existing body of research by focusing specifically on the digital transformation readiness of enterprises in An Giang Province. By leveraging established frameworks and methodologies, the study aims to provide a comprehensive assessment tailored to the unique context of An Giang. The findings from this study will contribute to the broader literature on digital transformation readiness and offer practical insights for local enterprises and policymakers seeking to enhance digital capabilities in the region.

In summary, the extensive body of related works provides a solid foundation for understanding the multifaceted nature of digital transformation readiness. This study seeks to add to this knowledge base by addressing a specific regional context and developing a tailored information system to facilitate effective assessment and analysis.

OVERVIEW OF OUR SYSTEM

The digital transformation assessment and consultancy system for businesses helps evaluate the current state of technology, processes, human resources, and security, thereby developing digital transformation strategies and roadmaps. It includes detailed planning steps, project prioritization, technical support, change management, digital skills training, progress monitoring, and effectiveness evaluation. Using data analytics and project management tools, this system helps businesses understand their current situation, optimize resources, reduce

risks, and enhance competitive capabilities, ensuring effective and sustainable digital transformation. Our system overview diagram is presented as follows: Figure 1.

Digital Transformation Assessment Process

The enterprise digital transformation assessment process includes the following steps: identifying digital transformation objectives; assessing the current technical and business state; analyzing the gap between the present state and the objectives; developing a detailed digital transformation roadmap; implementing and executing projects; measuring and evaluating results using KPI metrics; and continuously improving based on feedback and performance outcomes. This process requires the integration of technology, business processes, and change management to ensure sustainable success in a digital environment.

The tools and methods supporting the assessment are as follows:

Surveys and Interviews: Collect information from employees, customers, and stakeholders.

SWOT Analysis: Identify the strengths, weaknesses, opportunities, and threats of the enterprise.

Benchmarking: Compare with competitors or industry standards to assess the level of digital transformation.

Frameworks and Assessment Models: Use models such as the Digital Capability Maturity Model (DCMM) and the Digital Transformation Assessment Framework to evaluate digital maturity.

Digital transformation assessment requires a comprehensive approach, integrating technology, business processes, and change management to ensure the sustainable success of the enterprise in the digital environment.

Figure 2 Digital Transformation Assessment Process, conducted in 6 main steps:

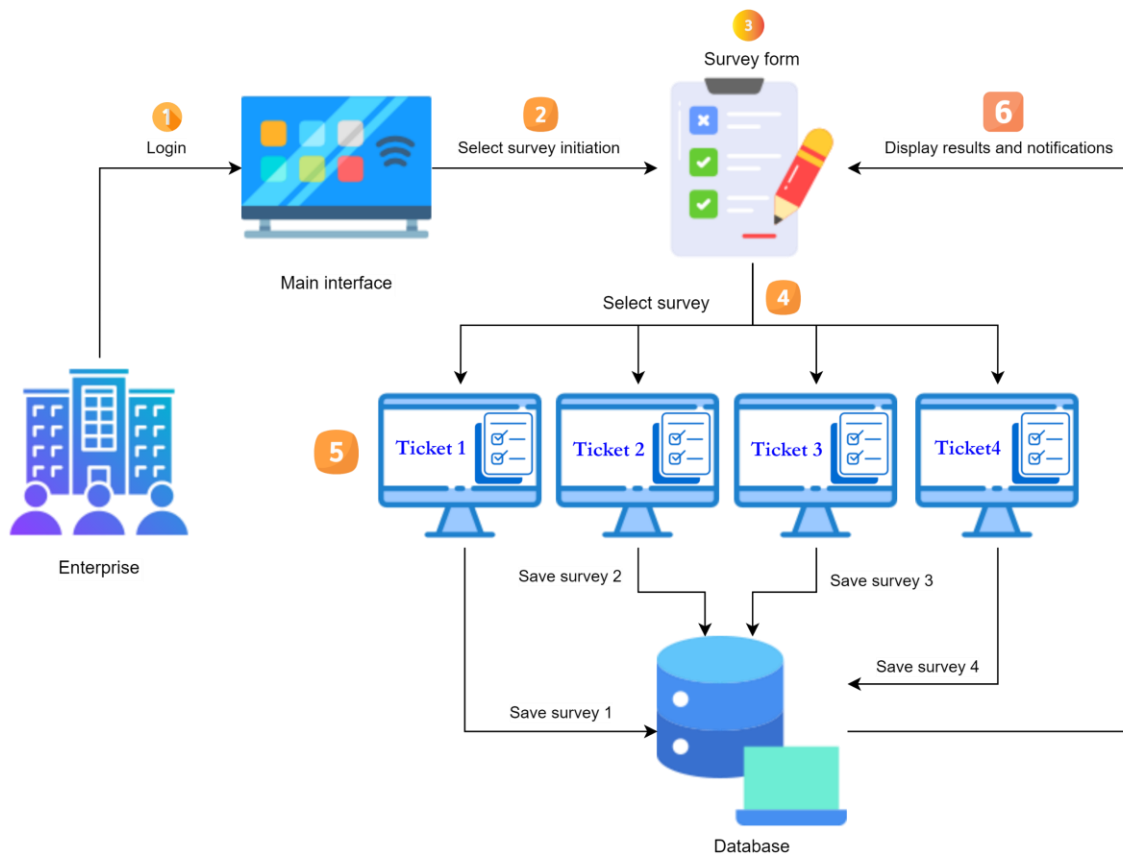


Figure 2: Management process to assess the level of digital transformation of the enterprise
Step 1: The enterprise logs into the website system. The system will display the main interface for the enterprise.

Step 2: In the main interface, the enterprise selects to initiate the survey.

Step 3: The system displays 4 sets of survey questionnaires (showing the completion count of each set, completion percentage, digital transformation strategy, and expert evaluation - recommendations upon survey completion).

Step 4: The enterprise selects the set of questions (set 1, 2, 3, 4) to survey.

Step 5: The system displays the content of the selected set of questions and value selection fields for each question. The enterprise reads the content and selects values for each survey question in the set.

Step 6: The system saves the results of each question upon each selection. After completing all the questions and clicking complete, a completion notification is shown, and then it returns to the interface to select another set of questions.

Digital Transformation Strategy Management Process

The digital transformation strategy management process includes defining vision and strategic objectives; assessing the current state and opportunities; developing the digital transformation strategy; creating detailed plans and allocating resources; implementing and executing initiatives; monitoring and measuring effectiveness through KPI metrics; and adjusting and improving based on performance results and feedback from stakeholders. This process requires the involvement of business leadership and coordination among departments to ensure success in a digital environment.

Figure 3 Presenting the Digital Transformation Strategy Management Process for administrators, conducted in

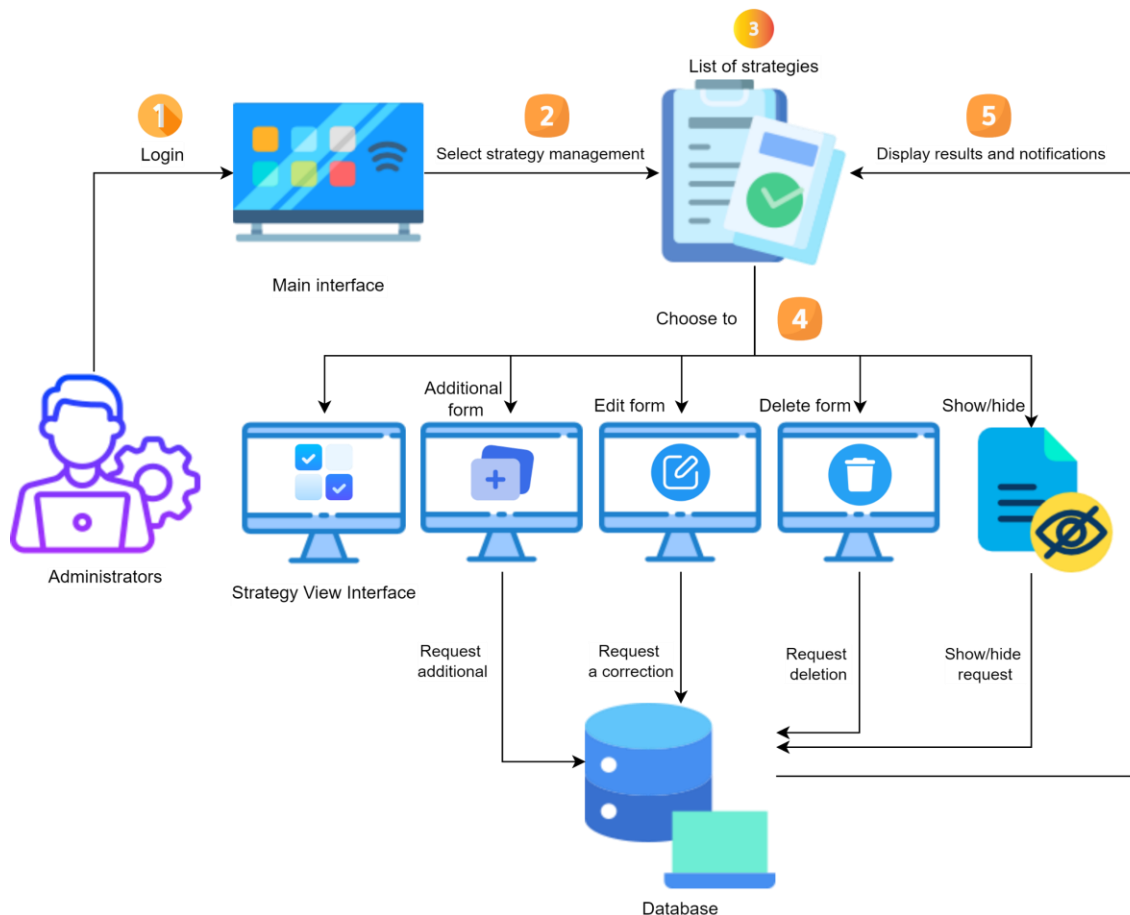


Figure 3: Digital transformation strategy management process

5 main steps:

Step 1: The administrator logs into the website system. The system will display the main interface for the administrator.

Step 2: In the main interface, the administrator selects to manage strategies.

Step 3: The system displays a list of digital transformation strategies.

Step 4: The administrator selects (view, add, edit, delete, or hide) a digital transformation strategy, then the corresponding interface is displayed. The administrator performs the corresponding function on the selected interface and clicks the button to update the database.

Step 5: The system checks the validity of the data and updates the database (add, edit, delete, or hide). For viewing, it only displays the data. Then, it notifies and redisplay the list of digital transformation strategies.

Overview Use Case Diagram of the System

Figure 4 Presenting the Overview Use Case Diagram for the Digital Transformation Survey System, including main functions such as login/register, manage personal information, conduct digital transformation surveys, and view survey results and analysis. Users can create, manage, and conduct surveys, then view and analyze results to better understand the level of digital transformation of the enterprise.

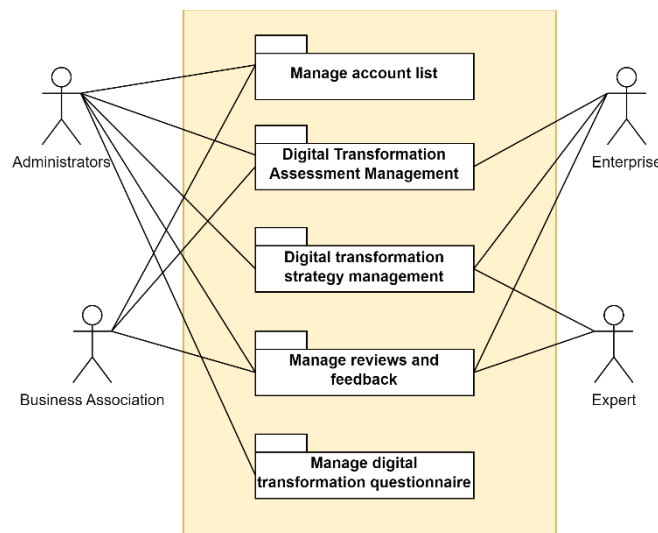


Figure 4: Use case diagram overview of digital transformation survey system

Process of Viewing Business Information for Digital Transformation Experts

The process of viewing business information for digital transformation experts involves gathering and analyzing data on the history, mission, business environment (PESTLE, SWOT), current technology and processes, organizational capabilities and culture, finances and business performance, current strategies and objectives, along with interviewing and surveying stakeholders. The results from this process help the expert understand the current situation of the business, identify opportunities and challenges, and propose appropriate digital transformation strategies. Figure 5 present the process of Viewing Business Information for Experts, conducted in 6 main steps:

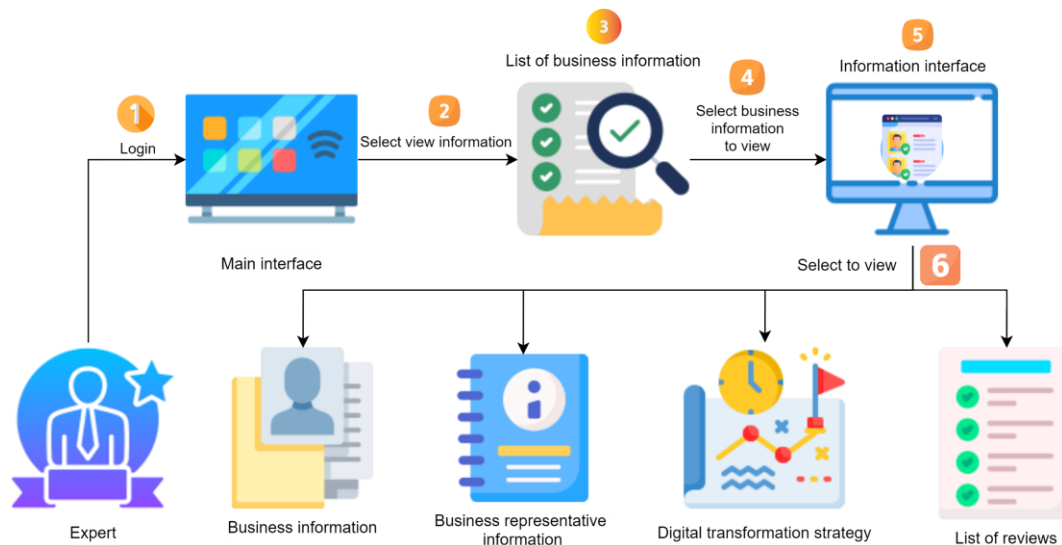


Figure 5: Expert's process of viewing business information.

Step 1: The expert selects to log in to the website system. The system will display the main interface for enterprise associations.

Step 2: In the main interface, the expert selects to view information.

Step 3: The system displays the interface with a list of business information.

Step 4: The expert selects a business to view information.

Step 5: The system displays the interface to view business information, including details, business representatives, strategy, and evaluation list.

Step 6: The expert selects each piece of information to view, and the system will display the corresponding content on the interface.

Figure 6 Presentation The business's digital transformation strengths statistics interface should include the following sections: overview with radar chart and highlights; technology infrastructure with bar chart and detailed list; digitalization process with progress chart; digital workforce with pie chart and detailed list; finance and ROI with line chart and data table; customer feedback with bar chart and detailed list; comparison with competitors with benchmarking chart; and detailed report with download button and detailed table, to provide a comprehensive and detailed view of the business's digital transformation strengths.

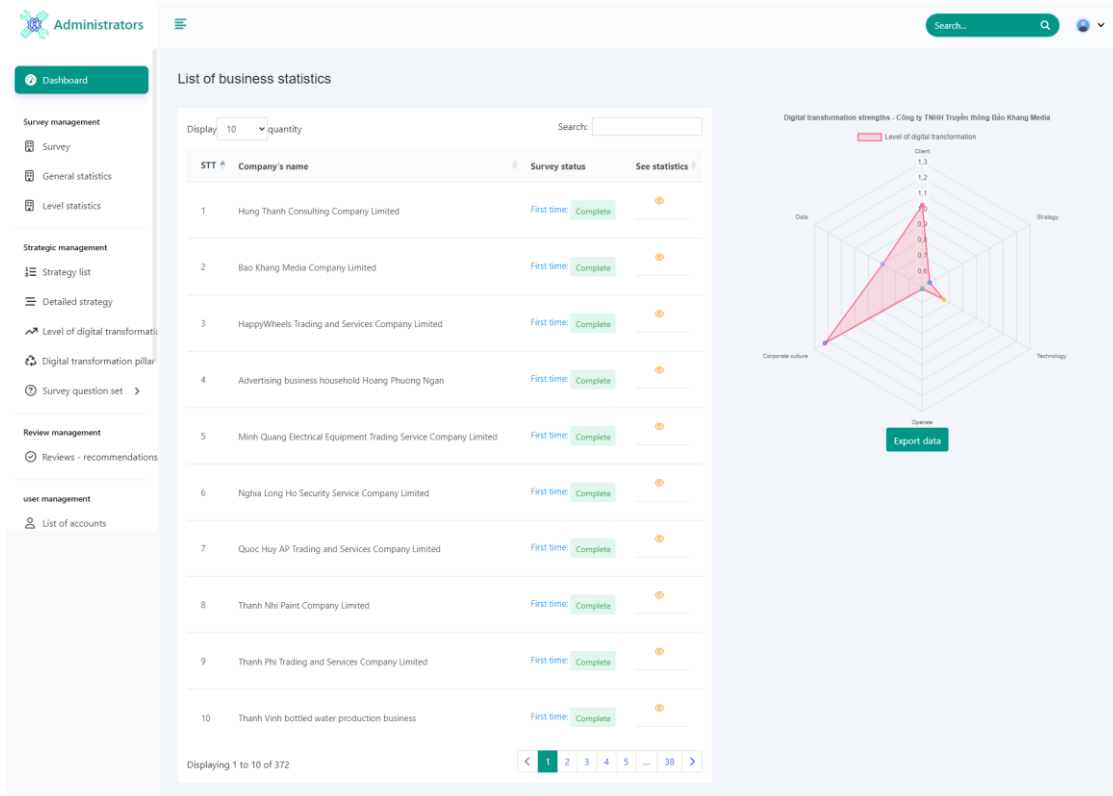


Figure 6 : Interface for statistics on the strengths of digital transformation of enterprises

Figure 7 The interface for notifications from digital transformation experts of the enterprise is designed to provide detailed and easily accessible information. It includes clear headers, date information, and the notification content divided into sections such as main announcements, featured notifications, and detailed content with information about initiatives, benefits, and objectives. The interface also includes a feedback section so that readers can provide feedback or contact the expert directly. This helps create an effective information channel and facilitates interaction between the business and stakeholders.



Figure 7: Notification interface from digital transformation expert

Figure 8 The business information viewing interface provides an easy-to-use and visually appealing overview and detailed view of the business. It includes general information about the business such as logo, name, description, and contact information, along with detailed sections about the industry, organizational structure, history and development, services or products, partners, and customers. The interface also includes a section for customer feedback and contact information so users can submit questions or requests. This helps create a comprehensive and user-friendly information channel for users to learn about the business.

Figure 9 The interface for viewing the digital readiness level of the business provides an overview and detailed view of the business's ability to adapt to digital transformation trends. This is demonstrated through charts or

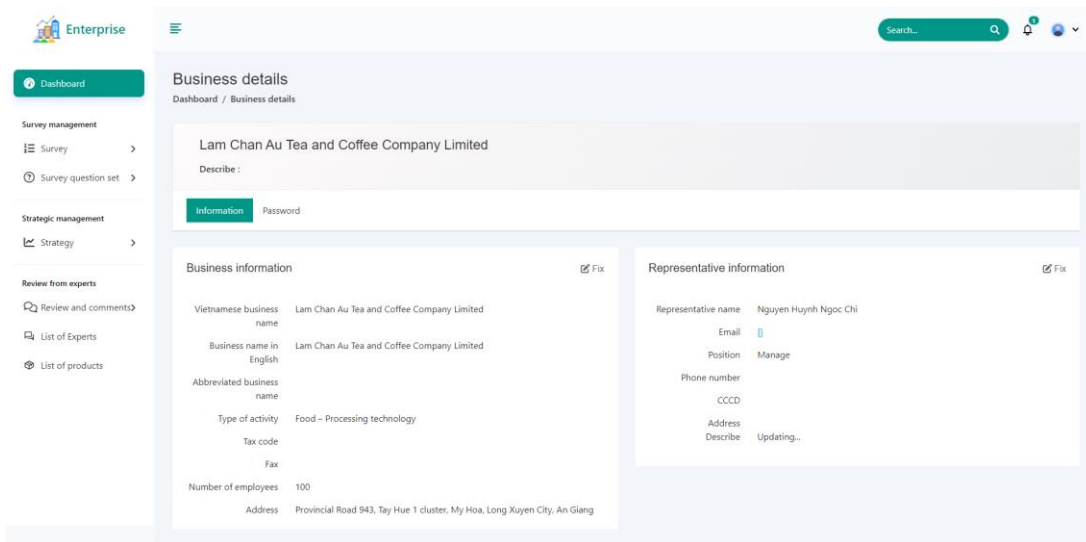


Figure 9 : Business information viewing interface

figures on technology infrastructure, human resources, strategy, and customer feedback. The interface offers detailed sections on each aspect, allowing users to access detailed information and link to reports or detailed documents. Interactive buttons help users easily access information or contact directly. Finally, copyright information and links to related pages complete the interface, creating a convenient and intuitive user experience.

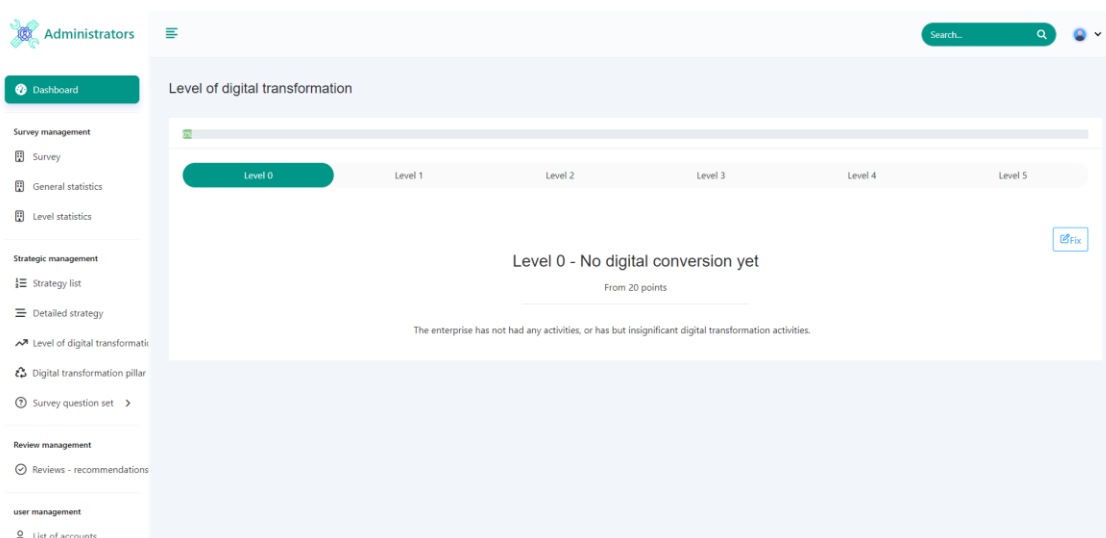


Figure 8 : Interface to view the digital transformation readiness of the business

Survey Results On The Digital Readiness Level Of Enterprises In An Giang Province

Figure 10 presents the sizes of businesses that participated in the survey. Out of 260 surveyed enterprises using a set of 4 survey forms: Survey Form 01 - Aggregate information on the digital transformation readiness index of enterprises, Survey Form 02 - Digital transformation of small and medium enterprises (SMEs), Survey Form 03 - Barriers to digital transformation in SMEs, and Survey Form 04 - Enterprises' opinions on digital transformation, 5% are micro-enterprises, 80% are small enterprises, and 15% are medium-sized enterprises, with no large enterprises in An Giang province.

Size of businesses participating in the survey

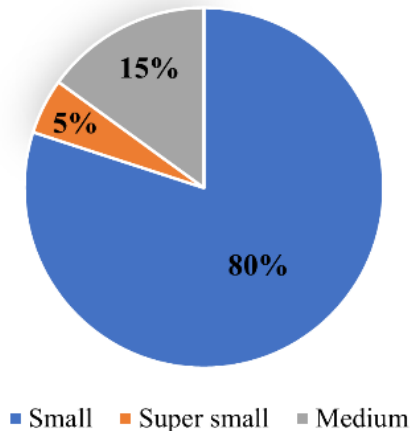


Figure 10: Sizes of Businesses Participating in the Survey

Figure 11 illustrates the survey results from businesses, with as many as 83.01% of surveyed businesses stating that the barrier they face when applying digital technology is due to high investment costs. Particularly, 87.60% of businesses believe that they currently lack digital infrastructure. This is partly influenced by the Covid-19 pandemic, which has caused businesses to face difficulties in revenue reduction and general capital shortages, thereby affecting investment, implementation, and maintenance costs for digital transformation solutions.

The difficulty in changing habits, business practices, and integrating digital technology is considered the second major barrier, causing businesses to struggle, accounting for 86.31% of surveyed businesses. According to feedback from businesses, digital transformation will change the habits and working methods of employees. Some businesses have implemented software, but employees either do not use it or only partially use it, hindering the achievement of the business's digital transformation goals.

Next, the difficulty of lacking internal manpower to apply digital technology is the third barrier, accounting for 87.67% of surveyed businesses. Over the past year, businesses' awareness of digital transformation has significantly improved, with many expressing intentions and needs for digital transformation. However, when businesses start aiming for digital transformation, they encounter difficulties due to the lack of experienced personnel with the knowledge and skills to implement digital transformation projects for their enterprises.

The fourth major barrier for businesses is the lack of investment funds for technology application, reported by 83.01% of surveyed businesses. The next two main barriers are the lack of commitment and understanding from employees, and the lack of information about digital technology, with respective proportions of 84.18% and 85.75%.

The remaining barriers such as the lack of commitment and understanding from the leadership and management of the enterprise, and fear of personal data breaches, are rated the lowest, with proportions of 84.18% and 84.86% respectively.

When delving into the analysis by business scale, we observe that the order of barriers among businesses of

different scales varies. Micro and small-scale enterprises often encounter the most difficulties in terms of finance and technology application due to limited resources. Meanwhile, medium-sized enterprises typically face the greatest barrier in changing business habits and practices. This largely stems from their more complex systems and processes compared to small enterprises, leading to challenges in adapting to change.

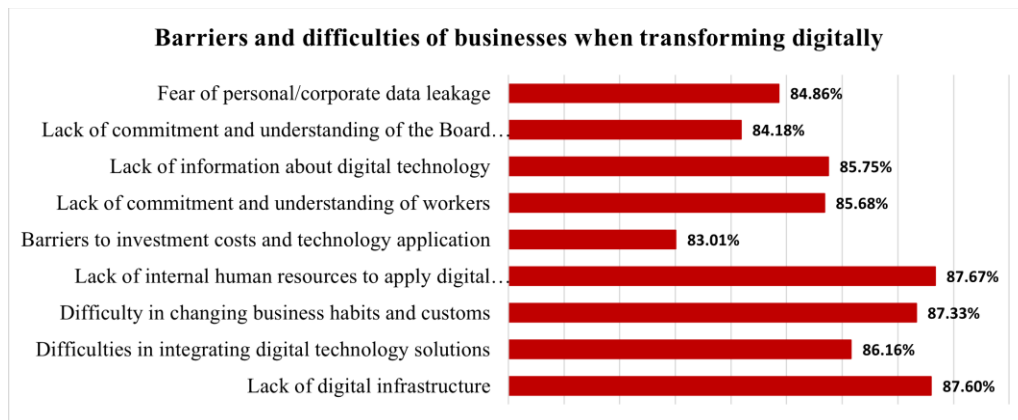


Figure 11 : The barriers and difficulties faced by businesses in digital transformation.

Figure 12 presents the readiness level of digital transformation (DLDT) of enterprises. The survey results show that only 7 enterprises have reached Level 3, 27 enterprises have reached Level 2, and 52 enterprises have reached Level 1. Notably, there are 209 enterprises at Level 0, meaning they are completely unprepared for digital transformation.

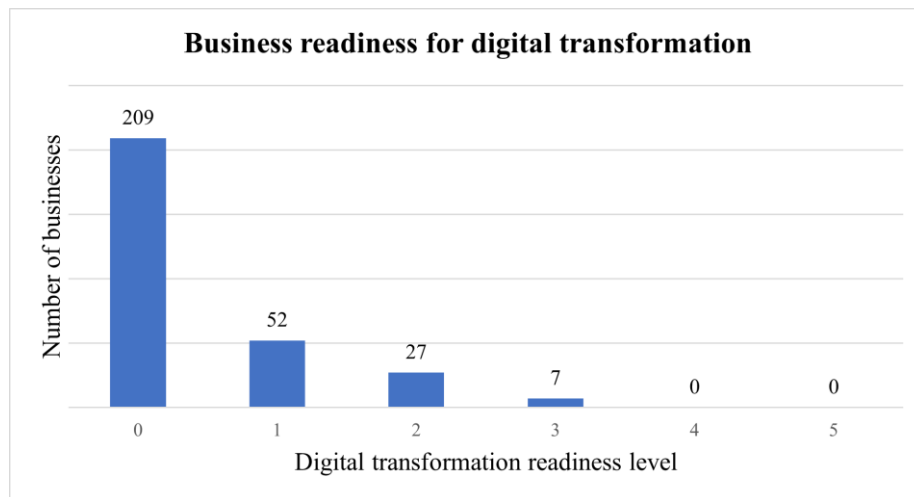


Figure 12 : Business readiness for digital transformation.

Figure 13 shows that the majority of surveyed enterprises in the districts have a low average readiness level of digital transformation (below 2.0), including the two major cities, Long Xuyen and Chau Doc.

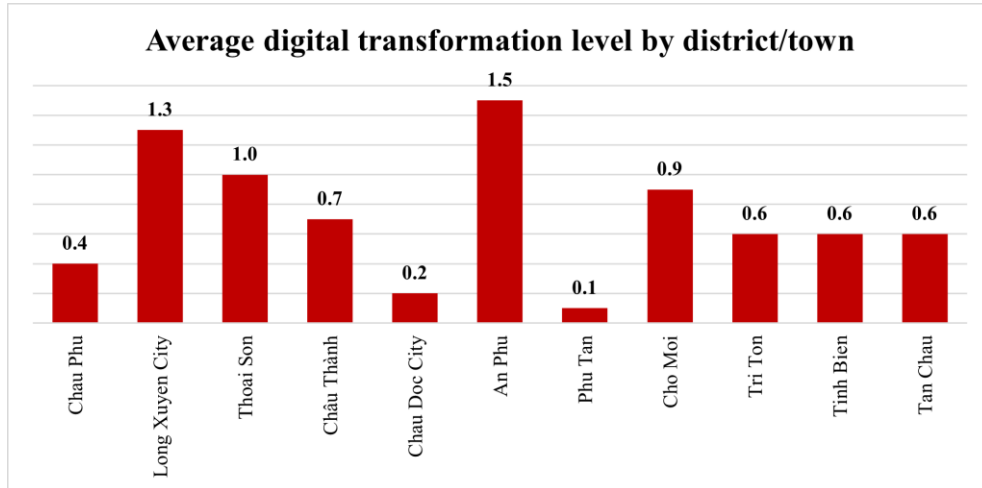


Figure 13 : Average digital transformation level by district/town.

Figure 14 presents the average digital transformation readiness level by sector. It can be seen that the readiness levels are very low (Level 1) across all three sectors.

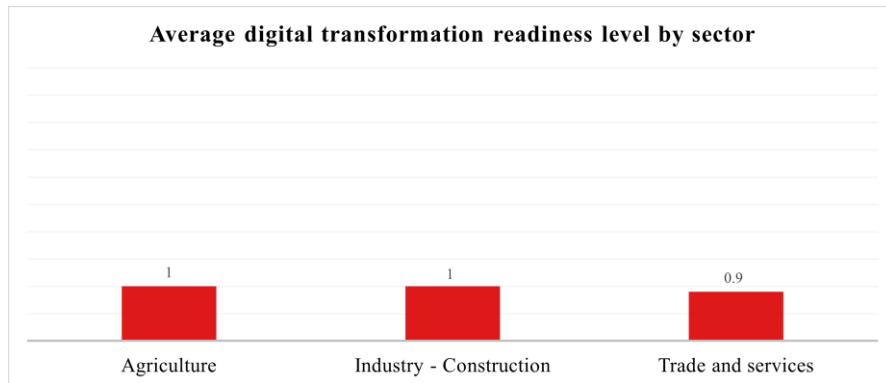


Figure 14 : Average digital transformation readiness level by sector.

The level of digital transformation readiness may vary across industries depending on various factors, including industry structure, organizational culture, and existing technologies. Figure 15 has presented the digital transformation readiness levels of some common industries.

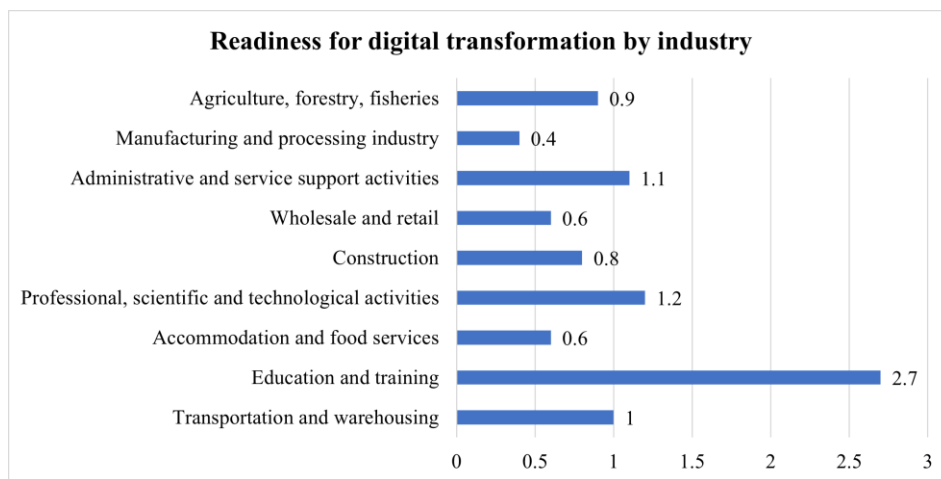


Figure 15: Readiness for digital transformation by industry.

According to the results of self-assessment of DLDT of 292 enterprises, overall, the enterprises' DLDT levels are low. Only the Strategic Orientation aspect of the enterprises achieved the highest average level, reaching 1.1. Data and information asset management still poses many challenges and has not proven to be truly effective compared to other aspects. The correlation of DLDT across the 06 aspects is presented in Figure 16.

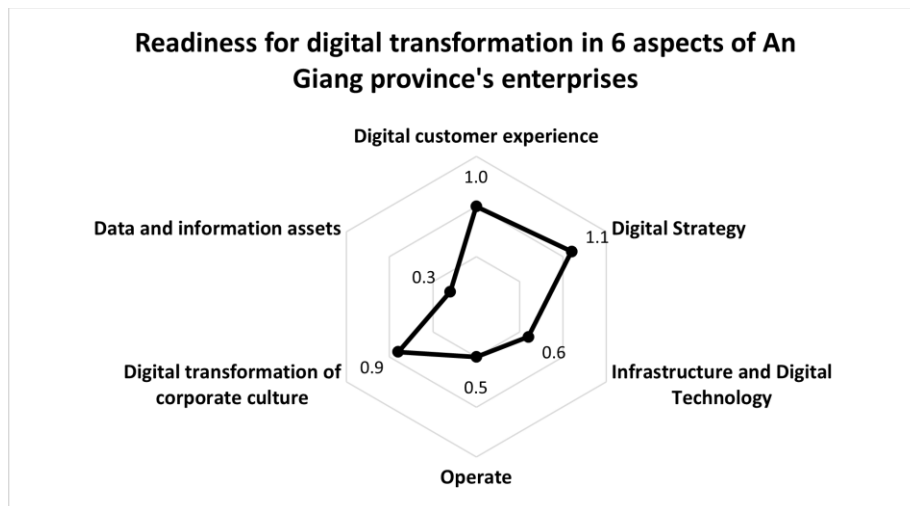


Figure 16 : Readiness for digital transformation in 6 aspects of An Giang province's enterprises.

Proposed Model and Roadmap for Digital Transformation in the Agriculture Sector

Based on survey data, expert opinions, and previous studies [12], [13], [14], a novel model and roadmap has been proposed for digital transformation in the agriculture sector in An Giang province, as shown in Figure 17.

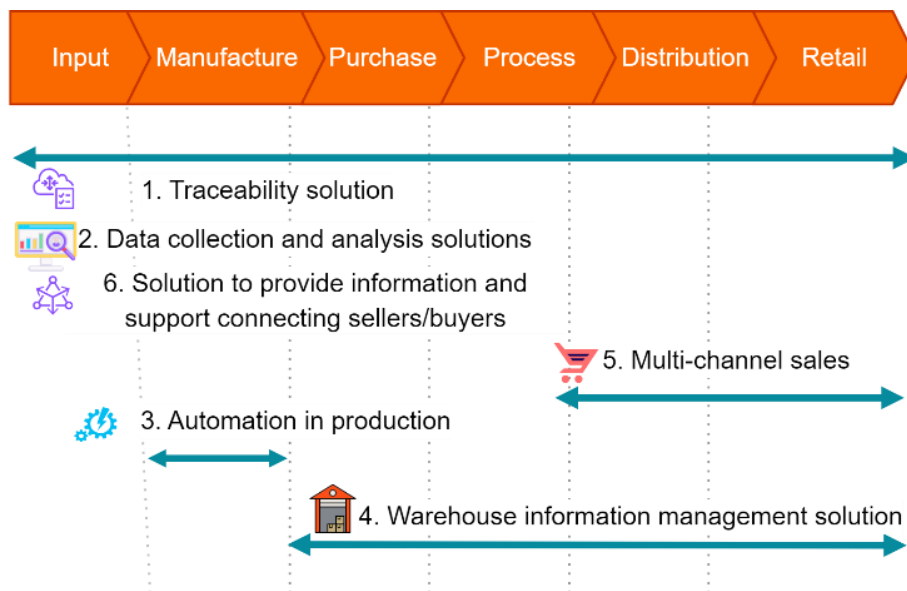


Figure 17 : Digital transformation roadmap for the agriculture sector.

CONCLUSION

This paper presents the development of an information management system for user accounts, designed for administrators and business associations to support the digital transformation process for enterprises. The system provides essential functionalities, including statistics, search, reporting, information viewing and editing, and password changes for all users. Businesses can evaluate their digital transformation progress using four integrated survey forms. Based on the survey results, the system automatically recommends appropriate digital

transformation strategies and enables experts to provide evaluations and feedback. Additionally, experts have the authority to manage and apply digital transformation models and strategies to specific businesses.

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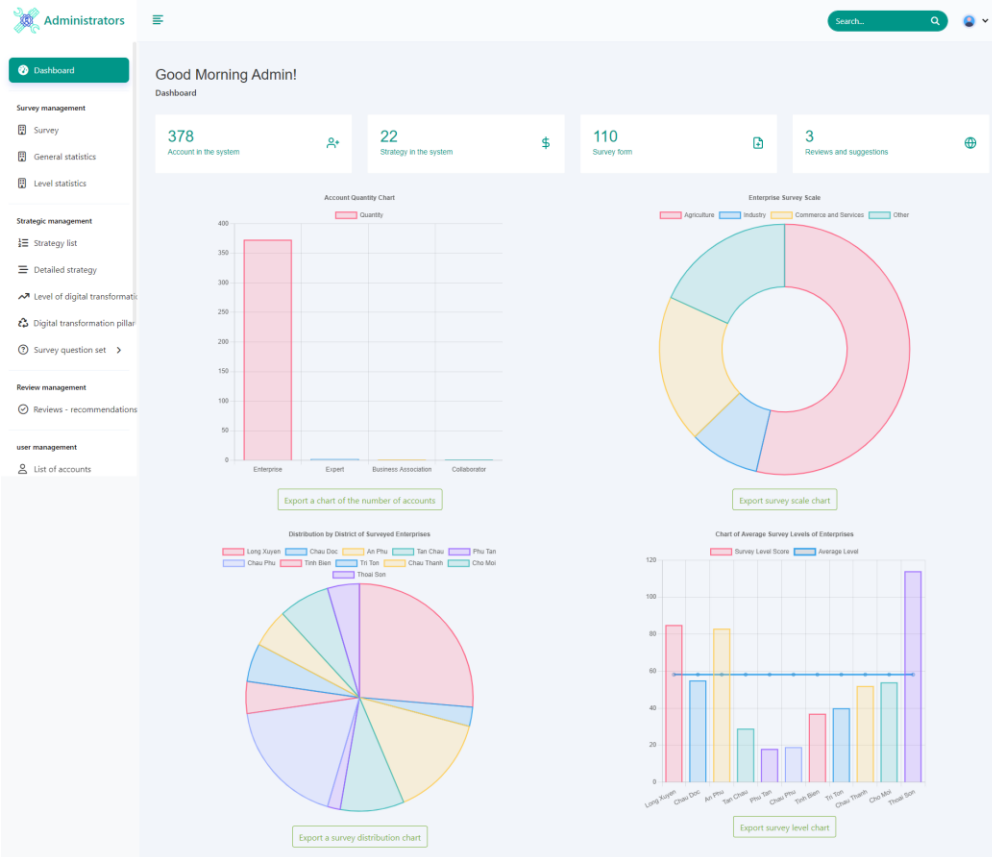


Figure 18 : Admin dashboard interface.