

RESEARCH ON BUILDING MANAGEMENT MODEL AND ENTERPRISE RESOURCE PLANNING FOR FOOTWEAR BUSINESSES IN VIETNAM

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Enterprise resource planning (ERP) is a fundamental tool in the digital transformation of enterprises. Currently, on the market, many companies are providing ERP solutions. ERP solutions can be packaged, customized, or can be open source. Packaged ERPs are often suitable for large enterprises. Small and medium shoe businesses need an ERP system appropriate for their financial resources, human resources, technology, management level, and management model. The article presents the method and results of building a suitable ERP and standardized management model for Vietnam's small and medium footwear enterprises (SMFE). In this study, the methods used were document review; a survey of SMFE and some footwear enterprises that have used ERP; software development methods. The built management model and ERP includes five subsystems: Supply chain management; Financial resource management, Human resource management, Customer relationship management, and Production management. The Production management subsystem includes five modules: Warehouse Management, Equipment management, Design-technology management, Production deployment, and Quality management. The results of ERP applications in Vietnamese shoe enterprise have proven that it is suitable and beneficial to enterprises.

Keywords: Digital transformation, Footwear enterprise, Enterprise resource planning.

INTRODUCTION

The digital transformation of companies, industries, and society is progressing at an accelerating pace (Baalmans *et al.*, 2023). Digital transformation refers to the integration, use, and exploitation of digital technologies to create major changes in value creation, appropriation, and distribution. The recent COVID-19 pandemic has shown the important role of digital transformation for enterprises, and the socio-economic sectors of a country (Hai *et al.*, 2021; Anh *et al.*, 2023). The Government of Vietnam considers digital transformation to be an important strategy for the country's socio-economic development (Decision No. 749/QĐ-TTg, 2020). The goal is that by 2030, Vietnam will become a digital country, in which, digital transformation for enterprises plays a particularly important role.

Enterprise digital transformation includes the application of digital technology to the production process of enterprises, business processes, business model innovation, and decision-making support. The three main components of enterprise digital transformation include the application of digital technology, organizational change, and value chain change. Digital transformation activities including: 1) Digitization of management and business data of enterprises; 2) Applying digital technology to automate and optimize business processes, management, production, reporting processes, standardize production processes and corporate governance processes; 3) Coordinate work in the enterprise to transform all business activities to create new value for the enterprise (Anh *et al.*, 2023; Annual Report on Vietnamese Enterprises' Digital Transformation, 2023; Phuc & Huong, 2024). Therefore, ERP systems are an important tool for enterprises to successfully digitally transform (Bui *et al.*, 2020). ERP is applied in many footwear enterprises in the world and brings benefits to them (Silva *et al.*, 2016; Study on Industry 4.0 applied to the footwear industry in Europe). Many ERP systems

have been developed for footwear enterprises in different countries (The Zymmetry Group, 2006; The Answer Company, 2015; SAP, 2009).

Vietnam is the 2nd largest exporter of footwear in the world (World Footwear, 2023). The leather and footwear industry is a major industry in Vietnam and has the potential to develop strongly in the coming period (Decision No. 1643/QD-TTg, 2022). The number of enterprises in Vietnam's footwear industry is quite large (nearly 2000 enterprises), of which over 80% are small and medium enterprises. Most of them are domestic enterprises (LEFASO, 2023). Digital transformation of enterprises with the application of ERP systems in the management of SMFE in Vietnam faces many obstacles, especially when applying foreign packaging ERP systems (Phuc & Huong, 2024; Bui *et al.*, 2020; LEFASO, 2023). Some of the main reasons are limitations in financial resources, human resource qualifications, technology and management models (Phuc & Huong, 2024; Bui *et al.*, 2020). In this study, we presented the results of building a standardized management model and an ERP system in accordance with the conditions of SMFE in Vietnam. They are built based on actual surveys of footwear enterprises and enterprises that have been using ERP. This is an important basis for the successful digital transformation of Vietnam's SMFE.

RESEARCH METHODOLOGY

The overall diagram of the research contents and main research methods is shown in Fig. 1.

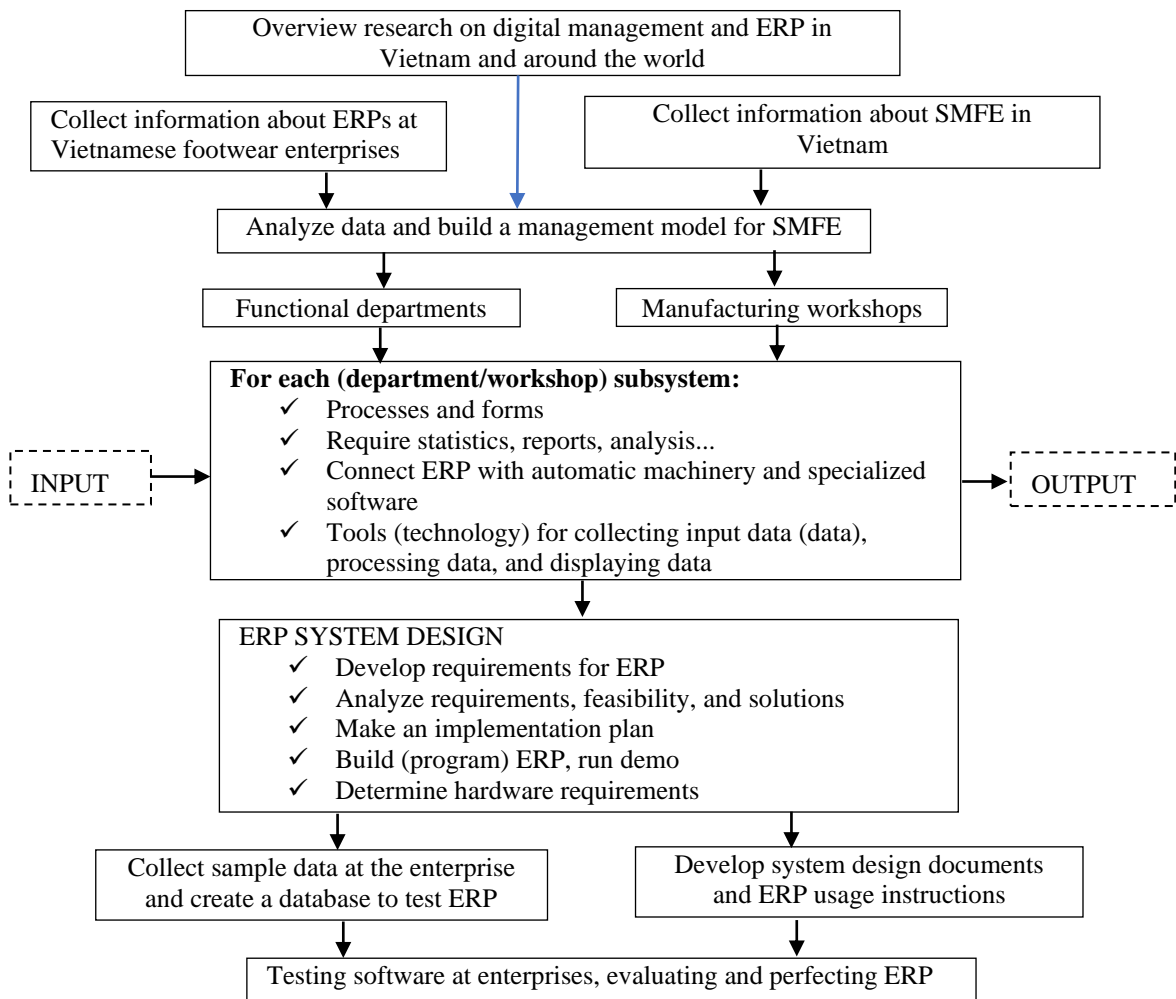


Figure 1. Overall diagram of the content and research methods

The basis for building the Vietnamese footwear enterprise management model and ERP for them is the information collected from these enterprises. The information that needs to be collected includes labor; enterprise management model; software usage; automated machinery and equipment in enterprises, equipment management; desired benefits in digital transformation; difficulties in digital transformation; suggestions and recommendations.

The basis for building ERP is a standardized enterprise management model. We build it in three steps: 1) determine the organizational model of the SMFE; 2) build a management organization structure suitable for the SMFE; 3) standardize each module. For each subsystem/module, we have identified and set up: 1) content or function; 2) requirements; 3) structure; 4) data linkage with other subsystems and modules; and 5) reporting, analysis and evaluation forms. From here, we build processes and forms for each subsystem/module.

ERP is a system that consists of software and hardware. Therefore, the method of building a system includes building software, identifying hardware equipment to collect, process and display data. The construction of ERP software is carried out according to the general and basic software construction method by following steps (Aptech): 1) determine requirements and solutions; 2) software design; 3) software programming; 4) testing and bug fixing. In order to complete the ERP system as well as promote it to footwear enterprises, we organized an ERP demonstration workshop for SMFE.

RESULTS AND DISCUSSIONS

Information Obtained from Vietnamese SMFE

SMFE has a labor scale of 500 to 2000 employees. These are private enterprises with domestic investment. A compact scale is also a favorable condition for the digital transformation of enterprises.

SMFE are organized according to a functional structure. The organization of these enterprise is compact, usually with a board of directors, below are functional departments and workshops (Fig. 2). The compact production organization and management apparatus is also a favorable condition for enterprise digital transformation.

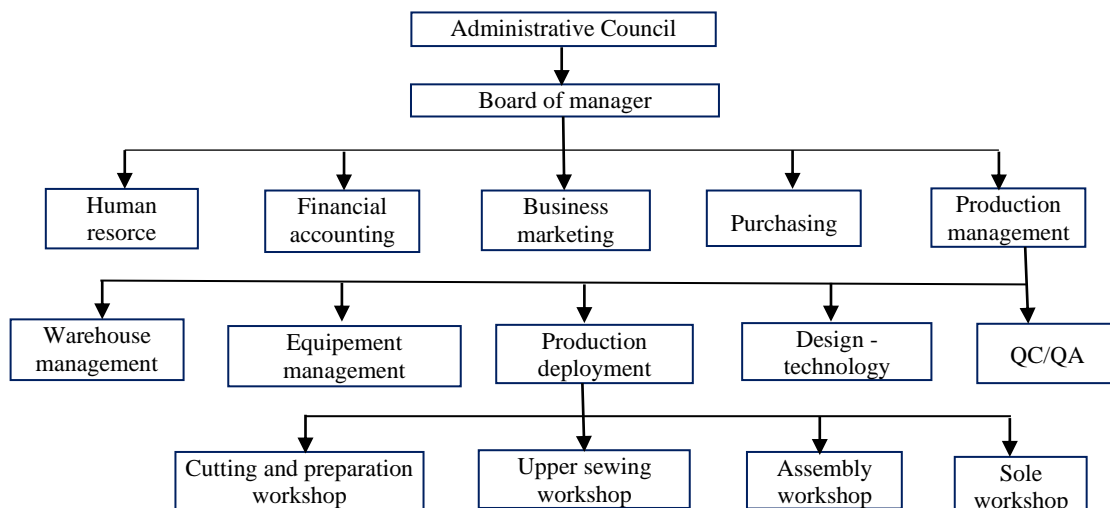


Figure 2. Diagram of the organizational model of the management apparatus of SMFE

SMFE usually produces a type of footwear such as sports shoes, canvas shoes, leather shoes, sandals... according to a certain sole assembly technology. In which, sole cementing technology is often used for sports shoes, leather shoes, and vulcanized rubber sole technology for canvas shoes. These are usually shoes with a long production technology

process with many stages, using a lot of manual labor, and the level of automation is not high.

About 70% of Vietnamese SMFE manufacturing products by CMT (Cut-Make-Trim) and FOB (Free One Board) methods for foreign brands. Some enterprises are more deeply involved in the development of products.

Machinery and equipment at SMFE are outdated compared to large and FDI enterprises. Automation equipment has not received much attention and investment. This not only affects labor productivity and product quality, but also hinders the application of Lean manufacturing and digital transformation. The flowchart of the footwear production process at SMFE is shown in Figure 3.

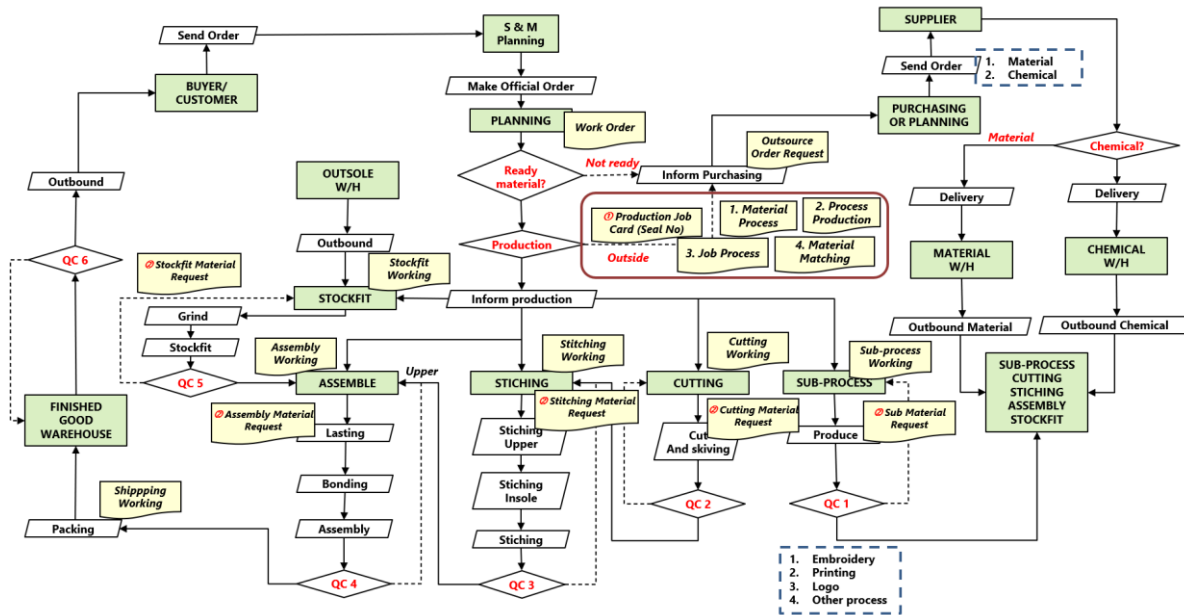


Figure 3. Flowchart of the footwear production process at Vietnamese footwear enterprises

SMFE are using the traditional method of organizing production with long lines. The enterprise organizes production according to separate workshops: Cutting and preparing semi-finished products; sewing uppers; producing soles and preparing footwear components; assembling, finishing shoe packaging; auxiliary parts or workshops (Fig. 3). Thus, the production cycle is long. This causes difficulty in quality management and enterprise digital transformation.

In surveyed enterprises, university-educated workers accounted for 5.7%, intermediate vocational workers accounted for 7.6%, and unskilled workers accounted for 86.7%. The low rate of trained workers leads to poor production management and limited application of advanced technology. This leads to low labor productivity and unstable product quality. This is also a major barrier for businesses when implementing digital transformation.

SMFE use individual software according to functions such as footwear design software, accounting software... About 10% of the surveyed enterprises use production and equipment management software.

Compared to large enterprises, the financial ability and access to finance of SMFE are much more difficult. Especially the difficulty in accessing bank loans.

Identifying Technology Tools for the Management of SMFE Applying ERP

Based on analyzing the types of technological equipment that can be used in the digital management of enterprises; the results of the actual survey of enterprises producing footwear; and the results of the survey of enterprises that have applied the ERP system; we found that there was no possibility to connect data of automated machinery and specialized software in

SMFE with ERP software. According to the characteristics of SMFE Vietnam, we selected the equipment according to the following criteria: 1) they are suitable for the ERP system; 2) they are not too expensive; 3) their technology is not complicated, as follows:

- Magnetic card or fingerprint reader timekeeping.
- Barcode system for statistics: Barcode printer, barcode scanner.
- The screen displays data and controls.
- Dashboard screen.
- Tablets and smartphones for data display and control (mobile).
- The workstation computers are ordinary PCs with a powerful enough configuration
- Investing in a physical server or renting a cloud server.

The Management Model Suitable for SMFE

The management model needs to meet the following requirements: 1) ensure representativeness, in accordance with the characteristics of Vietnamese SMFE; 2) be built based on the current organizational model of SMFE for convenient application; 3) be suitable and create favorable conditions for enterprise digital transformation. The enterprise management model consists of five subsystems with main functions (Fig. 4). The Production management subsystem consists of five modules (Fig. 5).

For each subsystem/module in the model, we have analyzed and established the following contents: 1) the content or function of the subsystem/module; 2) requirements for subsystem/modules; 3) structure of the subsystem/module; 4) link data to other subsystems/modules (Fig. 6); and 5) processes, forms, reports, analysis, and evaluation.

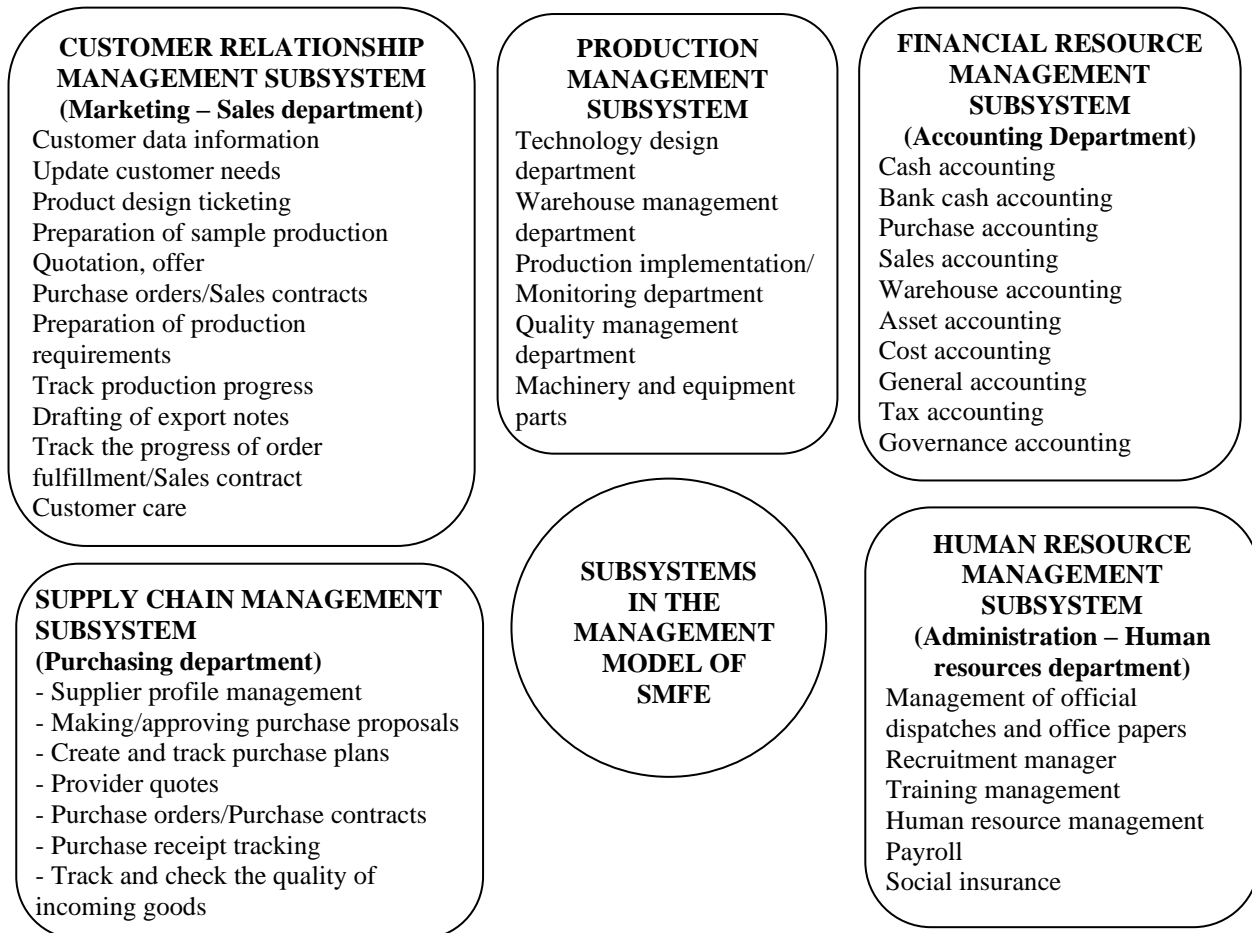


Figure 4. The management model of SMFE

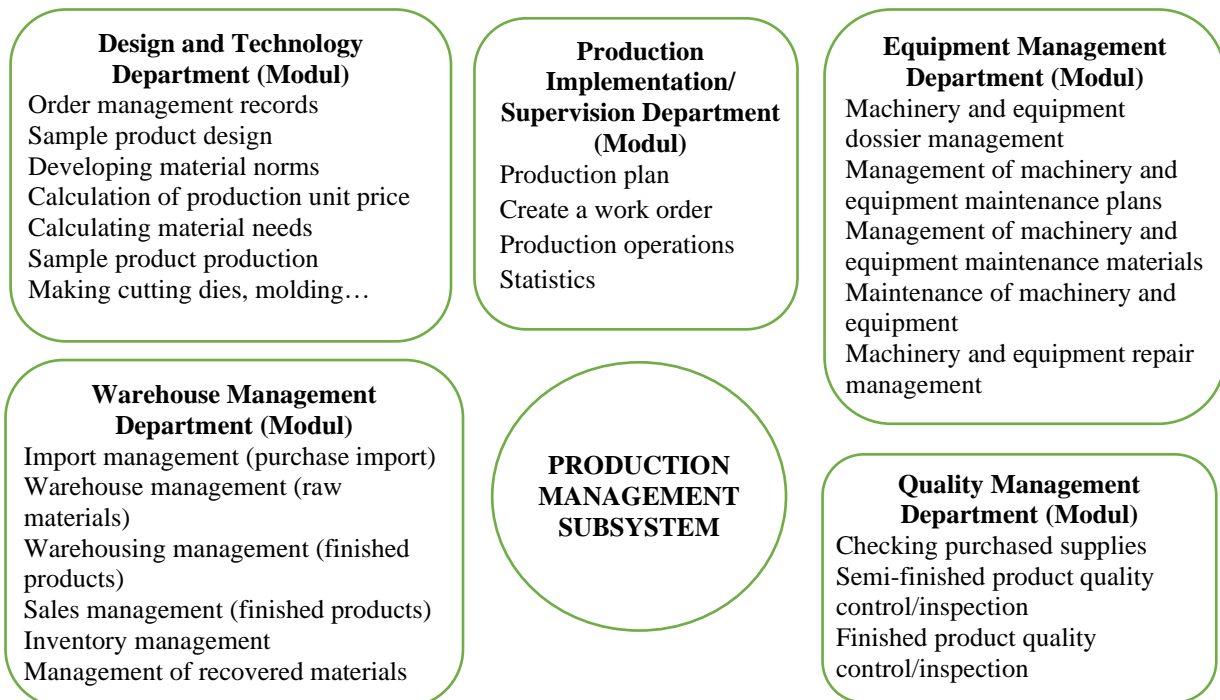


Figure 5. Production management subsystem structure in the governance model of SMFE



Figure 6. Modules and data links between modules in the enterprise

Results of Building an ERP System for SMFE

Requirements for SMFE: 1) ERP is suitable for the characteristics of Vietnamese SMFE; 2) integrating tightly between modules; 3) analyzing management operations; and 4) usability requirements: openness; correctness; usability; efficiency; compatibility; evolution; ease of testing, debugging and maintenance; reusability; and security (Aptech).

Solutions for ERP software: After analyzing the requirements, feasibility, to build ERP software for SMFE, we used:

- SQL SERVER database management system;
- Windows Server 2012 server operating system for PM ERP;
- Desktop Application Programming Language: VB.NET;
- Web Application Programming Language: C#;
- Desktop Application Programming Model – 3 layers (3-layer model);
- Web Application Programming Model – ASP. Net MVC.

Analyzing and designing systems, and technical aspects of ERP software: The overall structure and requirements of the modules/modules in the ERP system are shown in Figures 4 and 5. We perform the software programming for subsystems/modules in the ERP system for SMFE as follows: 1) building detailed functions for the software of each subsystem/module; 2) setting up UseCase for programming/coding the software. These tasks are performed on the basis of the functions, tasks, processes, forms/reports of the subsystems/modules in the built enterprise management model.

Building software programming and running ERP software demo: According to the results of analysis, software system design and setting up Usecases, we have designed the interface, programmed the software, and run a demo for each subsystem/module. The results show that, after fixing the errors, basically the ERP system can operate and perform the functions of each subsystem/module according to the set requirements. However, this is a large software with a high level of complexity, so there are still quite a few errors that need to be fixed to be perfected.

Applying ERP Software Testing to Footwear Enterprises

We set up a database from information collected at a shoe company that tested ERP. The company selected for ERP testing is Dong Hung Shoe Joint Stock Company in Ho Chi Minh City. The data is standardized according to processes, forms and reports according to the established management model.

We have developed a very detailed user manual, suitable for the labor level of Vietnamese SMFE. This document is trained for users. We supported the business to implement 3 shoe orders within 6 months. The results showed that the ERP system achieved the expected results, supporting the business well in implementing digital transformation.

Efficiency of ERP application at footwear enterprises: Although the time of applying ERP at shoe enterprises is not long, it has been positively evaluated by the leaders and employees of the enterprise. This ERP has brought good results to the enterprise, specifically: enhancing operational efficiency for businesses; integrating information; improving the competitiveness of enterprises; increasing transparency; enhancing customer satisfaction, efficiency, inventory management and customer care; changing the enterprise culture.

CONCLUSIONS

We have built an standardize management model suitable for Vietnamese SMFE. This is an important step in the digital transformation process of enterprises. This is the basis for us to build ERP. Subsystems/modules are integrated together on a software system that allows: 1) receiving information between different departments; 2) synchronizing all information, reducing data update and processing at multiple locations; and 3) allowing the establishment of professional rotation processes between departments. The results of the trial operation of the ERP system at the footwear enterprise show that: 1) The ERP is built in accordance with the characteristics of the SMFE in Vietnam; 2) ERP meets the management requirements of

enterprises, is highly appreciated by enterprises; 3) This ERP is ready to be replicated in Vietnamese footwear enterprises.

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