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Development and Implementation of Productivity and Quality Training Programs for the Universities in the Southern Region of Vietnam

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ABSTRACT

This paper presents the development process of training productivity and quality programs. These programs are integrated into the compulsory/elective courses in field economics, business, engineering, and technology training programs at the universities in the Southern region of Vietnam. The research uses document research methods, observation, interviews, scientific seminars, and surveys by questionnaires of target groups, as well as the expert method. A Ho Chi Minh City University of Technology case study presents a comprehensive methodology for designing training programs based on a competency framework, implementing and expanding Productivity and quality courses. Based on suggestions, the training program and curriculum framework are visualized. Some critical successes are present, and recommendations are suggested to update and confirm training programs. The training programs will provide essential updates for the teaching staff, allowing them to access the fundamental theoretical basis and general development trends in Productivity and quality. At the same time, the integration of training modules into the training program and closely linked to practice, will help supplement and update the relevant output standards to perfect essential skills, contributing significantly to the success of graduates in the labor market in the context of rapid changes in science and technology of the Fourth Industrial Revolution and the trend of increasingly deep and comprehensive international integration.

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1. Introduction

With the development of industrial, agricultural, and manufacturing systems, the productivity of all systems is evaluated by factors such as production methods, organizational activities, the development of technological innovations, organizational structure, specialization, size of organization, work ethics, and various input resources such as human, material, capital, electricity, etc. Almost all the factors have undergone a significant change [1]. Improving Productivity and Quality plays an increasingly important role in deep and wide global integration, helping to facilitate trade based on mutual recognition but posing challenges and meeting parties' requirements according to common standards. Productivity and quality training allow managers and executives to expand their employees' knowledge base. Continuous learning is a way for employees to stay aware of the latest developments in their industry and keep up with their peers in other organizations. It also allows them to understand any changes better to remain relevant. To realize the meanings, roles, and applications of tools to improve Productivity and Quality, education, training, and development of appropriate human resources to deploy and apply knowledge about improving Productivity and quality into practice is essential. Higher human capital leads to higher worker productivity and contributes to economic development [1]. The performance of human factors and the use of raw materials, energy, machinery, and equipment in production and service systems are substantial issues affecting the productivity management system in the economy. Human resource management has become increasingly crucial to increase production productivity [2]. They are trained in a primary and specialized manner to meet the requirements and tasks of the current labor market.

Developing high-quality human resources is not just important; It's a core element in ensuring economic development, sustainability, stability, and integration in developing a knowledge-based economy in globalization, international integration, and the fourth industrial revolution. Therefore, Training is an essential factor in deciding the long-term development of businesses. By providing knowledge and skills, training helps companies to adapt to constantly changing markets, reform internal processes in the industry, improve service quality, and attract customer interest [3].

The Vietnamese government has always focused on the human resources development strategy, which promotes industrialization, modernization, and international integration [4]. Asia-Pacific Economic Cooperation (APEC) membership, Vietnam has launched the training program on Productivity - Quality since the Busan Declaration (Korea) 2005, especially after the statement of the Ministers of member countries from the APEC conference in Vietnam in 2006: "Ministers recognized the importance of education on productivity improvement and encouraged members to develop curricula and reference materials to emphasize the significance of productivity improvement to promote businesses and facilitate trade in the region." The projects were implemented to unify training program materials and guidelines for education on productivity improvement [5]. However, most training programs focus on Quality knowledge. Meanwhile, productivity knowledge is more limited and is integrated into production management, operations management, and process improvement management [1]. Some universities in South Vietnam generally focused more broadly on industrial management training and paid significant attention to the knowledge base of Quality Management. In contrast, the knowledge associated with Productivity is integrated into subjects such as Production Management, Optimization of Operating Processes, and Process Improvement. Regarding training programs in engineering/technology, social sciences, and humanities, almost no universities offer courses on Productivity—quality in their training curricula. Therefore, a development plan for training on Productivity and quality knowledge is necessary to support these universities in implementing it for students in various fields.

Research aims: *To Design training programs based on a competency framework on the Productivity and Quality Management module, which equips knowledge and skills on productivity and quality for students of typical universities in the Southern region to develop human resources for management activities and promote national, industry, local, and enterprise productivity improvement. To create a comprehensive program, including detailed outlines, textbooks, reference materials, exercise books, and assessment methods. To Implement and expand the Productivity and Quality Management module training into a compulsory/elective course in the training programs of universities in the fields of economics, business, engineering, and technology in the Southern region. To enhance awareness, foster a culture of Productivity and Quality Management among high-quality human resources, and promote productivity, quality, and effective growth for Vietnam's economic development.*

2. Literature review

Competency framework and Competency-based training: Competency is defined as the ability of an individual to apply knowledge, skills, attitudes, and other necessary competencies to successfully perform and complete a specific job to a defined performance standard [6]. Competency refers to the ability to complete a related job, determined by an individual's knowledge and skills that follow the job requirements and organizational goals. These demonstrated ability which can be acquired via training [7]. Competency frameworks align training programs with business goals [8]. They provide a systematic approach to defining the specific knowledge, skills, abilities, attitudes, and behaviors required for an individual to complete work activities, be outstanding in their roles, and contribute to the organization’s success [2]. Competency-based training is a structured training and assessment system that provides learners with the knowledge and skills to complete jobs to a specified standard [5]. It strongly connects to human resource planning to meet the current labor market's requirements, tasks, and general corporate strategy [9].

Productivity and Quality: In business, productivity and quality are increasingly important in determining competitiveness and creating a solid foundation for organizational development. Productivity is the measure used to assess the achievement of the output produced with the input

resources [10]. Productivity is the ratio of input and output achieved at a certain point using available resources efficiently. In other words, it is the output ratio of production to one of the factors of production [8]. Increasing Productivity means maximizing the use of resources (Inputs such as labor, facilities, machines, and other resources), applying scientific production systems to reduce production costs, developing markets, and improving living standards to benefit customers [11]. ISO 9000 defines quality as the "degree to which a set of inherent characteristics fulfills the requirement." Quality can be viewed from different perspectives. When talking about quality, it is essential to refer to specific situations [1]. Quality is a general description of goods and services in promoting, designing, assembling, and maintaining, which makes the goods and services used to meet the buyer's assumptions. Product quality is the function, physical condition, and nature of goods or services that are identified based on customers' desired level of Quality to satisfy customer needs/requirements. Quality management focuses on increasing and improving the Quality of products and services and how to achieve it. Productivity management is designing, developing, and implementing methods and techniques to increase throughput by effectively utilizing and optimizing inputs while maintaining quality standards and satisfying the consumer's needs. Productivity and quality management are essential to an organization's management structure [12].

3. Methodology

Some methods of information collection are document research (collecting, analyzing, and synthesizing documents), non-experimental methods (observation, interviews, scientific seminars, and surveys by questionnaire of target groups), and the Expert method [13]. Information processing methods: Research domestic and foreign training documents on productivity and quality, combined training methods that focus on learners, and descriptive methods in the form of diagrams or mathematical expressions/models for qualitative information. Qualitative research methods are scientific approaches used to understand the meaning, interpretation, and context of the phenomenon under study. This approach emphasizes in-depth description, understanding, and analysis, focusing on qualitative rather than quantitative aspects [13].

To support the design, development, and expansion of knowledge on productivity and quality for universities in Southern Vietnam. The specific design steps are presented as follows: (These steps are not necessarily listed in strict order, as some steps are implemented simultaneously)

Step 1: Research domestic and international experience in training and building quality productivity modules associated with business operations.

Step 2: Survey and evaluate social needs and training status at typical universities in the Southern region related to Productivity and quality. Identifying the need for productivity and quality training programs involves understanding the aspirations, willingness, and capacity of the training group intended for and identifying cost-efficient ways to ensure that all participants can benefit equally. Training is unlikely to improve employability if the actual labor market's needs and opportunities are not identified. Not market-based training may lead to worse employment outcomes and an increased sense of alienation from the labor market for job seekers [5].

Step 3: Research the knowledge framework for student training quality and productivity. Draft and compile curriculum; Compile, review, and print textbooks on Productivity – Quality. This step's content involves collecting, evaluating, and synthesizing the organizations' curriculum design and training productivity-quality courses/programs, as well as studying detailed case studies of productivity and quality courses offered in several countries linked to business practices. This analysis can help identify the required knowledge, general skills, tools, and work attitudes or behaviors [6]. When the knowledge framework profile is complete, the information can be used to create training materials and prepare an action plan for new productivity-quality courses/programs according to the integrated framework for each manufacturing and services industry. To create a valuable knowledge framework profile, it is necessary to involve representatives of employers and workers, training providers, expert practitioners, and other stakeholders (instructors who participate as observers). The analytical procedures combine group interaction, brainstorming, synergy, and consensus. Such collaborations ensure a more comprehensive range of perspectives in the analysis and help promote coordination

among stakeholders, which increases the impact of interventions. These committees' primary roles are to ensure the quality and relevance of the training programs, provide resources and training equipment, recruit instructors, and employ graduates. The members also support identifying or approving program profiles/curriculum frameworks and participate in the task analysis. Developing competency standards after the knowledge framework profile will allow the identification of key knowledge areas, performance indicators, and criteria, as well as requirements such as transversal/generic skills, tools, assessment issues, etc., that should be addressed through developing the curriculum and identifying the required teaching and learning resources. Experts, industry/sector representatives, employers, trainers, and center managers should review and adjust competency standards according to each training field's needs. The final draft of the standards should be shared with a broad audience as part of the validation process [6].

Step 4: Discuss Quality Productivity awareness for the School Board. Hold a discussion on Quality Productivity awareness for the School Board and related members to implement training activities and bring quality productivity knowledge and training programs. Members to be mobilized: Board of Directors representatives, Training department leaders, Leaders of specialized departments participating in the program, Leaders of related departments, and Lecturers participating in the productivity-quality program. The objectives of the discussion are to Focus on improving productivity and competitiveness based on productivity and the change in global business contexts when the supply chain and value chain models have emerged and impacted the business context in Vietnam. Create a premise for including Quality Productivity content in the learning outcome (LO). The biggest goal in the awareness discussion is to create a commitment from the school leadership, faculties, and departments to implement training content on Quality Productivity.

Step 5: Prepare an implementation roadmap to form compulsory or elective modules for university productivity and quality courses. The roadmap includes identifying upcoming courses, generating, evaluating, and selecting particular course modules, producing impact assessments, and suggesting ways to improve procedures, processes, and systems for training. Build a detailed curriculum outline. The course outlines in the training programs are designed in a "learner-centered" direction through the philosophy of "theory linked to exercises and practical practice at enterprises" to enhance the practical experience of learners.

Step 6: Development of the training program. The next step is development. The training program serves as an essential guide for trainers, holding them accountable for the skills to be learned, as well as a means for measuring student performance. Table 1 outlines elements to consider when defining the framework for the training program. The steps to develop a productivity and quality program involve the following: Conduct training of source trainers, Prepare appropriate lectures and supporting/illustrative learning materials for training, Schedule training in each school's training program, Organize teams and clubs, Organize specialized seminars on Quality Productivity, Organize visits to businesses that have implemented productivity improvement projects and invite businesses to participate in support, Appraising, and feedback, Organize multi-school thematic competitions, Prepare to fund for activities that are not sponsored by students paying tuition fees for credits in compulsory or elective courses in the initial support phase of the activity.

Table 1. *Elements to consider when defining a curriculum framework (training program profile)*

Consideration	Content
Program rationale and objectives	Purpose and aims of the training program, including skills and competencies
Program eligibility and prerequisites	Which year are learners in? Previous qualifications/knowledge, entry test, etc.
Learning outcome	A learning outcome describes what the learners are expected to know, understand, and be able to do upon completing the learning.
Trainer requirements	Qualifications, experience, etc.

Training methodology	Case studies, modeling, coaching, e-learning, On-the-job training, video-based training, etc.
Training module design	Training modules, learning outcomes, performance criteria
Graduation requirements	Completion of several modules, etc.
The assessment method	tests, essay exams, written report assessments, etc
Accreditation requirements	Delivering, assessing, and certifying learners in programs (credits/points)
Proficiency level (skill level)	Skill level

Step 7: ***Communications and Plan for Expanding the program to the Universities in South Vietnam.*** When implementing the scaling-up plan, communication about the role, significance, and importance of introducing the productivity and quality management course will be carried out through various channels: introductory articles, workshops, experience-sharing seminars, student clubs at participating universities, business clubs associated with the universities, and university newsletters.

4. Results and Discussion

In South Vietnam, some universities have also implemented productivity-quality training in the regular university system. Table 2 presents some majors/programs and training methods at some universities in South Vietnam. In general, universities in South Vietnam focus on training in industrial management. Universities focus quite a lot on the knowledge of Quality Management. In contrast, the knowledge of Productivity is integrated into subjects such as Production Management, Optimization of Operational Processes, or Production Process Improvement. Particularly for majors/training programs in engineering/technology, social sciences, and humanities..., almost no school has a subject on Productivity - Quality in the training program. This is the limitation and gap leading to the need for development productivity and quality programs to be carried out, along with the related strategies of the country and VNU-HCM in the period of 2021-2030. To promote the national productivity and quality movement to develop more broadly and deeply from 2021 to 2030, especially in training activities, the Prime Minister has issued the following legal documents which state: "Organizing training for a team of high-quality productivity lecturers and expanding training on knowledge about Productivity - Quality in universities, colleges, vocational high schools, and vocational training" and emphasizes the solution of "Building and implementing training programs, fostering productivity, career guidance programs at some universities and vocational training institutions based on the needs of some specific enterprises, industrial parks, and high-tech parks [4], [7], [14]. On the side of Ho Chi Minh City National University (VNU-HCM), on April 19, 2021, VNU-HCM and the Ministry of Science and Technology (MOST) signed the Program for Coordination of Scientific and Technological Activities between the Ministry of Science and Technology and VNU-HCM for the period 2021-2025", in which content is: "Coordinate the implementation of national-level science and technology tasks, support businesses in research, innovation, technology transfer and application to improve productivity; implement productivity training programs for VNU-HCM students for the period 2021-2025; implement research tasks, training and development of productivity experts in VNU-HCM".

Table 2. *Statistical data on some majors/programs and training methods at some universities in South Vietnam.*

Training Facility	Major	Training Content	Training method
Ho Chi Minh City University of Technology (HCMUT)	Industrial management	Production and operations management. Quality management	Theory Teaching Q&A Factory Tour
	Industrial and System Engineering	Optimize operations and production processes. Production and Quality management	

International University (IU)	Industrial and System Engineering	Optimize operations and production processes. Production and Quality management
University of Economics and Law (UEL)	Business administration	Quality Management. Production Management. Travel and Tourism Management
Hong Bang International University	Industrial management	Quality Management. Production Management
Thu Dau Mot University	Industrial management	Quality Management. Production Management
Can Tho University of Technology	Industrial management	Quality Management. Production Management
Can Tho University	Industrial management	Management of industrial production and service systems

Ho Chi Minh City University of Technology (HCMUT) surveyed training needs on Productivity and Quality with the survey subjects, including lecturers, students, and alumni in the specialized fields and majors and training programs related to the field of productivity of member universities. The survey was conducted in July 2021 with 1,682 students, alumni, and 368 lecturers in member universities. The result shows the level of interest of lecturers and students in improving productivity and the high effectiveness of teaching courses, which is related to improving productivity at schools, is high. That can be seen in Figure 1. The results show the level of interest in the productivity and quality of lecturers and students in the member universities, with more than 60% being interested in and very interested in the field of productivity and quality. The proportion of engineering & technology and natural sciences students who are very interested in productivity and Quality accounts for more than 50%, and economics and management accounts for 23%. The proportion of lecturers in Engineering & Technology, Natural Sciences, Economics and Management accounts for about 86%.

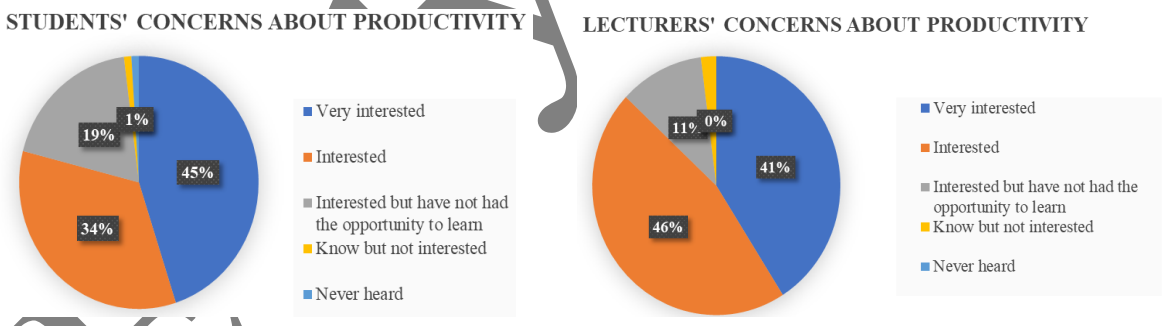

Figure 1. *The Concerns of Lecturers and Students about the Development Productivity and Quality Programs*

For typical universities in South Vietnam, currently, there are no courses (and textbooks) related to Productivity - Quality in the training programs of some majors; the specific proposed goal will be to deploy the construction of a new course equivalent to 3 credits (in the form of a compulsory/elective integrated into the training program or an equivalent short-term training course) on Productivity - Quality for 04 universities including Ho Chi Minh City University of Technology (HCMUT); The University of Social Sciences and Humanities; the University of Economics and Law (UEL); Ho Chi Minh City University of Science (HCMUS). Accordingly, the task will be to deploy related content such as developing course outlines (and evaluating them for inclusion in the training program), compiling and publishing textbooks, organizing pilot training courses for lecturers (to build a team of source lecturers), and short-term training courses for students. After that, an expanding plan to support school faculty in implementing training on the knowledge module on productivity for students of all majors is necessary.

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Phase I: Research the knowledge framework for student training quality and productivity. Draft and compile curriculum; compile, review, and print textbooks on Productivity and quality. This research used the collecting, analyzing, and synthesizing document methods for information collection and combined interviews, scientific seminars, and surveys by questionnaire of target groups, including representatives of employers and workers, training providers, expert practitioners, and other stakeholders (instructors who indirectly participated as observers) to develop competency standards and create a knowledge framework profile which can be used to create training materials and prepare an action plan for new productivity-quality courses/programs. According to the Asian Productivity Organization report, productivity tools and techniques can be classified into seven categories: Technology-based, Employee-based, Product-based, Quality-based, Task-based, Material-based, and Cross-functional/Interdisciplinary.

Phase II: Prepare an implementation roadmap to form compulsory or elective modules for university productivity and quality courses. The roadmap includes identifying upcoming courses, generating, evaluating, and selecting particular course modules, producing impact assessments, and suggesting ways to improve procedures, processes, and systems for training. This research surveyed target groups to develop competency standards and create a knowledge framework profile. The activities content includes collecting representatives of employers' and workers' opinions. Organizing a workshop to discuss the curriculum outline and draft curriculum content for 04 training providers (2 workshops/school), collecting 16 expert views on the outline and draft curriculum, and other stakeholders opinions (instructors who directly or indirectly participated as observers). Then, the development Team edits, comments, corrects, and completes the outline and textbook. Organize the appraisal of the draft textbook through two levels before the training providers approve it to be included in the training program: the Professional Council of the Host Unit and the Professional Council of the Commission for Standards, metrology, and Quality of Vietnam. Review and edit the draft textbook according to the opinions of the appraisal councils. The expected results are as follows: A textbook on Productivity—Quality meets the appraisal requirements of the Professional Council of the Commission for Standards, Metrology, and Quality of Vietnam (see Figure 2). The Productivity - Quality textbook is about 200 pages, including seven chapters. The first four chapters are general knowledge about productivity and quality, and the following three chapters present knowledge about productivity and quality applied in the fields of Science and Technology, Social Sciences, Humanities and Law, Economics, and Management. 01 outlines with three credits for 01 compulsory subject, and 03 new elective subject outlines with three credits on Productivity - Quality equivalent in the training program is developed. 03 new elective subject outlines on Productivity - Quality, equivalent to 3 credits in the training program, are assessed by the General Department of Standards, Metrology, and Quality, as presented in Table 3.

Figure 2. *Cover the productivity and quality management textbook and the decision to allow the use and circulation of the textbook as a teaching and learning material for students at Ho Chi Minh City University of Technology (HCMUT).*

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Table 3. *Elements in a curriculum framework (training program profile for the field of Science and Technology)*

Consideration	Content
Program rationale and objectives	This course provides students with an overview of productivity and quality, productivity and quality management systems, the fourth industrial revolution, the industry 4.0 ecosystem, advanced manufacturing systems, Industry 4.0 manufacturing, intelligent manufacturing, and advanced technologies that enhance productivity and quality in production. This course provides students with an overview of productivity and quality management systems and Industry 4.0 technologies, enabling them to participate in designing and applying these systems and technologies in production.
Training program	over 10 days (20 sessions)
Program eligibility and prerequisites	Courses in the Graduation Knowledge Module. Which year are learners in? Previous qualifications/knowledge, entry test, etc.
Learning outcome	Understanding the overview of productivity and quality. Understanding the overview of the fourth industrial revolution. Understanding the components of the industry 4.0 ecosystem. Understanding the advanced manufacturing systems, Industry 4.0 technologies go hand in hand with productivity and quality. Teamwork and communication
Trainer requirements	Instructors who directly participated completed the Quality Productivity Instructor Training Program or had certificates of equivalent Qualifications and experience related to the Quality Productivity area.
Training methodology	Teaching in class, videos, slides, instructions for implementing group topics, Study, exchange, finding documents, and teamwork
Training module design	01 outlines with three credits for 01 compulsory subject (include 150 lessons/hours with 30 lessons/hours for Lectures, 50 lessons/hours for projects, 70 lessons/hours for self-study)
Graduation requirements	Completion of several modules, etc.
The assessment method	Final tests, essay exams, and written report assessments.
Accreditation requirements	Delivering, assessing, and certifying learners in programs (credits/points)
Proficiency level (skill level)	Skill level 1-2

Phase III: Development of the training program. The next step is the actual development of the training program. The training program serves as an essential guide for trainers, holding them accountable for the skills to be learned, as well as a means for measuring student performance. The steps to develop a productivity and quality program involve the following:

Step 1: Conduct source trainers training at Southern Vietnam's typical universities. The course aims to improve teaching methods and the quality of instruction, leveraging teaching technology to enable instructors to develop sustainable long-term competencies. The course covers both subject matter and teaching methodologies over 15 days. Universities can customize this training content depending on the level of understanding among participants regarding teaching methods and subject expertise. The course will be structured in sessions, allowing participants to access teaching materials and resources and interact with peers. Modern teaching methods are introduced: Identify the Kolb Learning Style and the requirements for building lectures that meet the subject's output standards; HoTs: Everyday Activities, Integrated Design Problems, Real experience in the Desktop Project (Group interaction activity); Flipped Class Lesson Plan; Video clip building applications and teaching support tools; and Building a Course Portfolio. Some of the source trainers' training course activities are illustrated in Figure 3.

Figure 3. *Some activities in the source trainers' training course.*

Step 2: Prepare supporting/illustrative learning materials and appropriate lectures for training. Schedule training in each school's training program. Before expanding the program to the universities in South Vietnam, the program will be implemented for students at the University of Science and Technology over 10 days (20 sessions) to test the content, learning materials, and corresponding teaching methods for each learning outcome (Learning Outcome). Some of the students' training course activities are illustrated in Figure 4.

Step 3: Organize teams and clubs. Step 4: Organize specialized seminars on Quality Productivity. Step 5: Organize visits to businesses that have implemented productivity improvement projects and invite businesses to participate in support. Step 6: Appraising and feedback. Step 7: Organize multi-school thematic competitions. Step 8: Prepare funding for activities that are not funded by students paying tuition fees for credits in compulsory or elective courses in the initial support phase of the activity

Figure 4. *Some activities in the source trainers' training course.*

Regarding the course content for Productivity and Quality programs, it is necessary to continue refining the content to ensure its suitability for universities' specific characteristics. This can be achieved by developing case studies related to the particular training programs and the unique traits of the institution, the instructors, and the students. It is essential to maintain the core content of the "Management of Productivity and Quality" course as approved while still allowing for flexibility, richness, and diversity in the content when teaching through case studies.

Phase IV: Communications and Plan for expanding the program to the universities in South Vietnam.

5. Conclusions

This research indicated that developing and deploying productivity and Quality training plans for the universities in the southern region of Vietnam is essential. A process roadmap is designed to integrate productivity and quality courses into the universities' curricula, helping to implement training and raise awareness effectively. The training program based on the competency framework and curriculum materials is developed to equip students with the essential foundational knowledge before graduation, enabling them to apply it confidently in improvement activities. To implement the scaling-up plan, communication about the role, significance, and importance of introducing the productivity and quality

management course, Specifically, the General Department of the Commission for Standards, metrology, and Quality of Vietnam and the unit responsible for implementing the scaling-up plan needs to:

Continue to connect and maintain a network of instructors from participating universities to organize scientific research activities, coordinate training and consulting on productivity and quality for organizations and businesses, and share information about the project's results. Continue to connect and maintain a network of students trained in productivity and quality from participating universities to provide new theoretical and practical training activities and programs, monitor and maintain information about this student network, and develop new activities to disseminate information about productivity and quality to new generations of students. Conduct follow-up surveys with students after training to evaluate long-term results and propose further support to enhance the project's outcomes. Continue to connect with organizations and businesses that have supported the project to strengthen collaboration in training and scientific research, recruit students, and create internship opportunities for new students participating in the productivity and quality management course. Through this network, introduce trained students in productivity and quality management to organizations and businesses, helping to connect supply and demand in the labor market and promote training activities in this field.

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Conflict of interest

The authors declare no conflict of interest between each individual and organization in this study.

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