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VALUE CHAIN ANALYSIS IN VOCATIONAL HIGHER EDUCATION: MAPPING PRIMARY AND SUPPORT ACTIVITIES

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ABSTRACT

Vocational education plays an important role in preparing graduates with practical skills that meet industry demands. However, the educational process in vocational institutions often involves a series of interconnected activities that are not always clearly understood in terms of how value is created. Previous studies on value chain analysis in education tend to focus on institutional performance, with limited attention to program-level analysis, particularly in vocational culinary education. This study aims to analyze and map the primary and supporting activities that shape the educational process using a Value Chain Analysis approach. It adopts a qualitative descriptive method and is designed as a single-case study of the D3 Pastry Arts Program at NHI Bandung Tourism Polytechnic. Data were collected through observation, in-depth interviews, and document analysis, and were analyzed using NVivo software. The findings show that primary activities consist of input, operations, output, marketing, and services, while supporting activities include human resource management, technology development, infrastructure, and procurement. The study reveals that value creation is mainly driven by practice-based learning, particularly laboratory activities and industry internships, which transform theoretical knowledge into practical competencies. At the same time, supporting systems such as infrastructure and human resources play a critical role in ensuring the effectiveness of these processes. This study contributes to vocational education management by demonstrating how Porter's Value Chain framework can be adapted to a practice-based learning context. The findings also provide practical insights for improving program management and strengthening the alignment between education and industry needs.

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1. INTRODUCTION

Vocational education is very important for getting people ready to work in factories. Vocational education, on the other hand, focuses on teaching students how to utilize their knowledge in real-world situations, while academic education focuses on theoretical knowledge. So, the effectiveness of vocational education is generally judged not just by how well students do in school, but also by how well they can adapt to the changing needs of the business (Yusuf, 2022). These demands have become stronger in recent years due to changes in technology, work patterns, and the global economy.

In a broader context, vocational education is increasingly recognized as a strategic sector in Southeast Asia, driven by the growing demand for a skilled and industry-ready workforce. Several countries in the region, such as Indonesia, Malaysia, Singapore, and Thailand, have actively integrated vocational training into their workforce development policies to respond to global economic and technological changes. This trend also reflects a stronger alignment between vocational education and industry needs, particularly in developing practical skills, strengthening industry partnerships, and improving workforce competitiveness (Usup et al., 2024)

The food business, especially the pastry and bakery disciplines, is one of the fastest-growing industries right now. The café business is growing in many cities in Indonesia. This shows that it is not only growing economically, but it has also become a part of people's daily lives. Cafés are no longer just places to dine and drink; they have become social spaces and creative centers that encourage new ideas in food and drink (Sutianah, 2021). This change indirectly raises the need for people who can deal with technology, be creative, and come up with new ideas for making pastries and baked goods.

The NHI Bandung tourist Polytechnic is one of the vocational colleges that focuses on training people to work in the tourist industry and other related fields. One of the study programs that will help students become professionals is the D3 Pastry Arts Program. The goal of this curriculum is to provide students the technical skills they need to make pastries and baked goods, as well as the management skills they need to work in the food sector. The Common ASEAN Tourism Curriculum (CATC) has also made sure that the curriculum is in line with industry standards.

In practice, however, managing vocational education is not without its problems. There are still a lot of things that need to be worked on, such practical facilities, improving faculty skills, and using technology in learning. In vocational education, learning activities frequently include a lot of different things that are all related, such as providing resources, putting learning into practice, and working with the industry. So, it's important for schools to know how these activities work together and add to the process of creating value in education.

Value Chain Analysis is one way to make sense of these operations. Porter initially came up with this idea as a way to analyze the different things a business does to provide value for its consumers (Porter, 1985, p. 33). In this paradigm, an organization's operations are seen as a set of related actions that together create extra value. These operations are

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usually divided into two groups: primary and support. Both groups help the firm and its customers create value.

The Value Chain Analysis method was first used in the manufacturing business, but it may also be used in the service industry, such as higher education. In educational institutions, value is not derived from the production of things but from the interplay of several activities associated with the learning process, the enhancement of student capabilities, and engagement with external stakeholders. So, the value chain model has to be changed to fit the demands of higher education. Pathak and Pathak (2010) say that in the context of higher education, important activities may include the learning process, building student skills, and building linkages with alumni and industry. In the meanwhile, supporting operations include managing human resources, building institutional infrastructure, and making instructional technology that helps students learn.

Several prior research have demonstrated that Value Chain Analysis may elucidate the activities occurring within educational institutions. For instance, Heriyanto (2019) research shows that higher education institutions may increase the quality of their educational services by mapping their core and supporting activities. Other research shows that value chain analysis can help schools find activities that help students learn better and build their skills (Bety et al., 2025). Dorri et al. (2012) further stress that the value chain method can give a more complete view of how different activities in higher education institutions work together to produce educational value.

However, previous studies mostly focus on general higher education or do not specifically examine vocational culinary programs. In addition, many studies emphasize institutional evaluation rather than mapping value creation at the study program level. This indicates a gap in understanding how value is created through interconnected activities in vocational culinary education.

Nonetheless, studies explicitly delineating the value chain in vocational education programs within the culinary sector is still rather few. Pastry arts and other programs that focus on hands-on learning include a lot of different activities that make up its structure. In addition to studying in the classroom, the educational process includes lab work, internships in the business, and other ways of working with industry partners. The intricacy of these actions highlights the necessity of delineating fundamental and ancillary activities to comprehend the generation of educational value in the vocational learning process.

This study differs from previous research by focusing on a single case of a vocational higher education program in the pastry field and by applying Value Chain Analysis to map activities at the program level.

Based on this background, the research problem of this study is how primary and support activities are structured and how they interact to create educational value in a vocational higher education program.

This study aims to analyze and map the primary and support activities within the educational process of a vocational study program using Value Chain Analysis. The findings are expected to contribute to vocational education management and provide insights for improving educational quality.

2. RESEARCH METHODS

This research utilizes a qualitative framework using a descriptive methodology. The qualitative technique was used to facilitate an in-depth comprehension of phenomena, specifically about the activities occurring within the educational process at the Vocational Education and Training Center for vocational study programs. Qualitative research enables researchers to have a deeper contextual comprehension of an event by direct engagement with individuals and the observation of naturally existing situations (Sugiyono, 2023). Researchers utilizing this strategy concentrate on both the ultimate outcomes and the processes and significances that arise from the many activities being examined.

In qualitative research, the researcher is the most important tool for gathering and interpreting data. This indicates that the researcher is actively engaged in field observations, interviews, and data analysis, allowing a deeper understanding of the research context (Fitrah & Luthfiyah, 2018).

The D3 Pastry Arts Program at the NHI Bandung Tourism Polytechnic was the setting for this investigation. The selection of this site was based on its relevance as a vocational education program in the culinary field with practice-oriented learning and strong industry linkage.

The research participants were deliberately chosen based on their roles and expertise related to both academic and operational aspects of the program. The participants included the program director, internship coordinator, laboratory coordinator, quality control representative, storekeeper, and lecturers involved in the educational process. In total, six informants were involved in this study.

Data were collected through observation, in-depth interviews, and document analysis. Observations were conducted to understand real learning activities, particularly practical sessions. In-depth interviews were conducted in a semi-structured format to explore participants' experiences and perspectives in more detail. Each interview lasted approximately 45–90 minutes.

Document analysis was carried out by examining curriculum documents, partnership records, and other academic reports to complement the data obtained from interviews and observations.

To ensure data validity, triangulation was applied by comparing data from different sources and methods. This process helps improve the credibility of the findings (Sugiyono, 2023).

Data were analyzed using NVivo software to facilitate coding, categorization, and identification of patterns. The analysis followed the stages of data reduction, data display, and conclusion drawing, as proposed by Miles and Huberman as cited in Rijali (2018), which emphasizes the interactive and continuous nature of qualitative data analysis.

The coding process was guided by Porter's Value Chain framework, where primary and support activities were used as initial categories, while still allowing new themes to emerge from the data.

Ethical considerations were applied by informing participants about the research purpose and ensuring confidentiality through anonymization of their identities.

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This research aims to identify and delineate activities within the study program and to understand how these activities contribute to value creation in vocational education.

3. RESULTS AND DISCUSSION

Primary Activities in the Value Chain

The research findings suggest that the instructional process in the D3 Pastry Arts Program may be comprehended through a sequence of interconnected primary activities. These activities are the most important part of the value creation process in vocational education since they are directly related to learning activities, the growth of students' skills, and the results of the program. The core activities of this program may be organized into five broad groups: input, operations, output, marketing, and services. This categorization corresponds with the value chain framework introduced by Porter (1985) and its subsequent adaptation to the higher education sector by Pathak & Pathak (2010). In this study, these categories were applied deductively based on Porter's framework, allowing the analysis to systematically map educational activities into value-creating components.

Input activities are the different basic materials needed to start the learning process. In the pastry program, inputs are not just students, but also teachers, curriculum, facilities, and institutional support. Research findings suggest that the student admission process operates via a selection mechanism consistent with vocational education norms, while the curriculum is aligned with the Common ASEAN Tourism Curriculum (CATC), ensuring its relevance to industry needs. This is reflected in interview findings where an informant stated that "The curriculum has been tailored to meet industry needs, so students learn not only theory but also practical skills relevant to the workplace." (Program Director). Practical facilities also play a crucial role in supporting input quality. However, the data indicate that facilities still require continuous improvement. As noted by another informant, "The training facilities are adequate, but they do need to be continuously upgraded to keep pace with developments in the pastry industry." (Laboratory Coordinator).

Operational activities represent the core transformation process where inputs are converted into competencies through classroom learning, laboratory practice, and industry internships. A crucial characteristic of this program is the emphasis on "learning by doing," where students are directly involved in practical production activities. This finding is not only descriptive but also reflects a key value creation mechanism in vocational education. This is consistent with the study by Bety et al. (2025), which highlights that practical-based learning contributes significantly to the development of students' competencies, particularly in vocational settings where hands-on experience becomes the main learning driver. Students also participate in internships, which provide exposure to real working environments. This is supported by an informant who stated that "Internships are an important part of the experience because they allow students to get a firsthand feel for industry standards." (Internship Coordinator).

Output activities are related to the competencies produced by the program. Graduates are expected to possess both technical skills in pastry production and managerial abilities. These competencies are formed through an integrated process involving classroom

instruction, laboratory practice, and industry experience. This finding aligns with Heriyanto (2019), who emphasizes that value creation in higher education is reflected in the quality of graduates as the final output of interconnected institutional activities. In addition, some students demonstrate entrepreneurial potential, indicating that the program not only prepares graduates for employment but also supports self-employment opportunities.

Marketing activities refer to institutional efforts to promote the program and attract prospective students, including participation in education fairs and the use of social media. Meanwhile, service activities are reflected in the program's relationships with alumni and industry partners. These relationships play an important role in sustaining the relevance of the program. This is in line with Dorri et al. (2012), who explain that value in higher education is not only created internally but also through continuous interaction with external stakeholders such as alumni and industry.

Supporting Activities in the Value Chain

In addition to primary activities, this study identified several supporting activities that ensure the effectiveness of the educational process, including human resource management, technology development, infrastructure, and procurement. These activities function as enabling systems that support the execution of primary activities. Human resource management focuses on recruitment, training, and development of lecturers and staff. In vocational education, the presence of practitioners is particularly important. This is supported by an informant who stated that "Practitioner-instructors are very important because they bring firsthand industry experience into the classroom." (Lecturer).

Technology development also plays a significant role in supporting learning activities, particularly through digital platforms and academic systems. Infrastructure, including laboratories and practice rooms, is essential in ensuring that practical learning can be conducted effectively. Procurement processes support the availability of tools and materials needed for hands-on learning. These findings are consistent with Kholis et al. (2019), which explains that supporting activities such as infrastructure and resource management are critical in ensuring the effectiveness of value creation processes in educational institutions. Furthermore, Mardhia (2024) highlights that supporting systems in vocational education play a strategic role in strengthening the implementation of learning activities, particularly in improving students' practical competencies.

Beyond their functional role, supporting activities also reflect the institutional capacity in managing vocational education as an integrated system. For instance, the alignment between human resource development and curriculum implementation indicates that lecturers are not only delivering content but also actively adapting teaching methods based on industry demands. This condition suggests that supporting activities are not merely administrative, but also pedagogical in nature, as they directly influence how learning is designed and delivered. This finding is relevant to previous studies that emphasize the importance of institutional readiness in ensuring the success of vocational education programs, particularly in bridging the gap between education and industry requirements (Maryam et al., 2024).

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In addition, the interdependence between infrastructure, technology, and procurement processes highlights that the sustainability of practical learning relies heavily on institutional support systems. The availability of updated equipment, learning technologies, and materials determines whether practical learning can simulate real industry conditions. As indicated in the findings, limitations in facilities and technology may affect the effectiveness of learning outcomes, especially in practice-based programs such as pastry arts. This reinforces the argument that supporting activities play a strategic role in maintaining the quality and relevance of vocational education, rather than simply acting as complementary components.

Although the categorization of supporting activities in this study mainly followed Porter's framework using a deductive approach, several findings also emerged directly from the field. For example, the important role of industry practitioners and the need for continuous improvement of facilities were not only based on theory but also reflected real conditions in the program. This suggests that the application of value chain analysis in vocational education cannot be applied in a rigid way, but needs to be adjusted to the specific context and characteristics of the institution.

Value Chain Mapping of the Study Program

This study then generated a value chain map for the D3 Pastry Processing and Art-e Program based on the examination of the main and supporting activities that were found. This mapping was done to figure out how different parts of the curriculum work together to add value to vocational education.

Generally, key activities like inputs, operations, outputs, marketing, and services are very closely related to supporting activities like human resource management, technological development, infrastructure, and procurement. The connection between these activities shows that creating value in vocational education doesn't just depend on learning activities; it also depends on having good support mechanisms in place.

Figure 1 shows the findings of the value chain mapping for the study program. It shows how the main and supporting activities in the educational process are related.

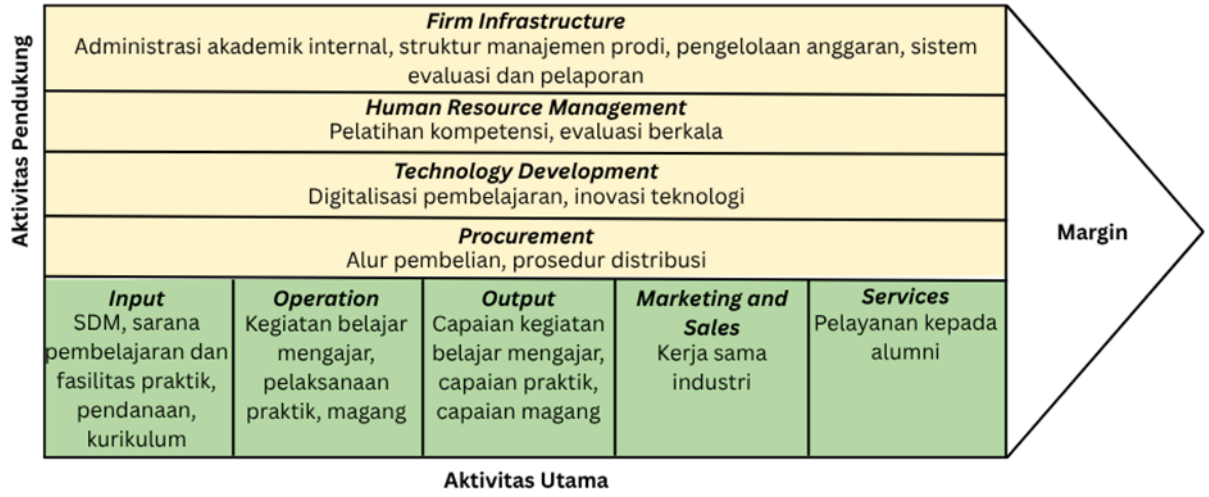

Figure 1. Results of the Value Chain Analysis for the D3 Pastry Arts Program

Figure 1 illustrates how these activities are interconnected within the educational process. Rather than merely describing the structure, the mapping reveals how value is created through the interaction between activities. The analysis shows that the strongest value creation occurs in the operational stage, particularly through laboratory practice and internships, where theoretical knowledge is transformed into practical competencies.

At the same time, the mapping also indicates that the effectiveness of primary activities is highly dependent on supporting activities. For example, limitations in infrastructure and technology may reduce the effectiveness of practical learning, which in turn affects the quality of outputs. This suggests that value creation in vocational education is not linear but systemic, where weaknesses in one component can influence the overall process. This finding reinforces the argument by Pathak & Pathak (2010) that value in higher education is generated through the integration of multiple institutional activities rather than isolated processes. In addition, this also supports the view that vocational education requires strong alignment between learning processes, facilities, and industry relevance in order to produce competitive graduates (Tobing & Manurung, 2021).

When compared with previous studies, this research provides a more specific contribution by focusing on the study program level. Bety et al. (2025) and Maryam et al. (2024) analyze value chain implementation at the school level, particularly in improving student competence and institutional performance, while this study shows how value is created within a single vocational program through practice-based learning. Similarly, Heriyanto (2019) discusses value chain at the institutional level, whereas this study offers a more detailed mapping of activities in a vocational culinary context.

However, this study also has limitations that need to be considered. The research focuses on a single study program, which limits the generalization of findings to other contexts. In addition, the data are primarily obtained from internal stakeholders, so external perspectives such as industry partners and alumni may not be fully represented. These limitations suggest that future research could involve multiple institutions or include broader stakeholder perspectives to provide a more comprehensive understanding of value creation in vocational education.

4. CONCLUSION AND RECOMMENDATIONS

Conclusion

This study seeks to delineate the core and ancillary activities within the educational framework of the D3 Pastry Arts Program via a Value Chain Analysis methodology. The study findings indicate that the educational process within this program comprises several interconnected activities that collectively establish a value creation system in vocational education.

This study found that the main activities are inputs, operations, outputs, marketing, and services. Input activities include students, curriculum, lecturers, and facilities as the initial resources of the learning process. Operational activities represent the core process through classroom instruction, laboratory practice, and industry internships. Output

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activities are reflected in graduates who possess technical and managerial competencies relevant to industry needs. Meanwhile, marketing activities relate to institutional efforts in attracting students, and service activities are reflected in relationships with alumni and industry partners.

In addition to primary activities, this study also identified supporting activities such as human resource management, technology development, infrastructure, and procurement, which play an essential role in ensuring that the educational process runs effectively. These supporting activities strengthen the implementation of primary activities and contribute to the overall value creation process.

This study shows that the educational process in the pastry arts program is not a single activity, but a system of interconnected activities that support one another. The interaction between primary and supporting activities becomes a key factor in creating educational value, particularly in producing graduates who are aligned with industry demands.

Beyond describing the activities, this study also contributes to the development of vocational education management by demonstrating how Porter's Value Chain framework can be adapted to a practice-based learning context. The findings show that value creation in vocational education is not only determined by learning activities, but also by the integration between academic processes and institutional support systems. This highlights that the value chain concept can be extended from business contexts to educational settings, particularly in vocational higher education.

From a managerial perspective, the results indicate that improving the quality of vocational education requires not only strengthening core learning activities, but also enhancing supporting systems such as infrastructure, human resources, and technology. This integrated perspective provides a more comprehensive approach for managing vocational education programs.

Recommendations

Based on the research findings, several recommendations can be proposed for both practical improvement and future research. First, from a practical perspective, the program needs to continuously improve its practical facilities and strengthen the use of technology in the learning process. In vocational education, hands-on experience is not just an additional component, it is the core of learning. Because of that, ensuring that equipment, laboratories, and learning technologies are up to date with industry developments becomes very important.

Second, collaboration with industry should not only be maintained but also expanded. A strong and consistent relationship with industry partners can provide many benefits. It can improve the quality of internship programs, open more job opportunities for graduates, and at the same time give valuable input for curriculum development so that it remains relevant.

In the short term, the program can focus on optimizing what is already available. For example, improving the use of existing facilities, maximizing the role of learning technologies, and strengthening coordination in internship implementation. These steps may seem simple, but they can have a direct impact on the effectiveness of the learning process.

In the longer term, more strategic efforts are needed. This includes upgrading infrastructure, increasing the involvement of industry practitioners in the learning process, and developing a more adaptive curriculum that can respond to future industry trends. These changes may take time, but they are important to ensure the sustainability and competitiveness of the program.

Finally, for future research, there is still a wide opportunity to explore value chain analysis in vocational education. Further studies can examine how value chain activities influence graduate competitiveness or institutional performance. In addition, involving more than one institution or including perspectives from external stakeholders, such as industry partners and alumni, would provide a more comprehensive understanding of how value is created in vocational education.

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