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Challenges and Opportunities of Computer Science Internships in Local Industries

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Abstract: *This study investigates industries' willingness to hire computer science student interns from the Universiti Teknologi MARA (UiTM) Sabah Branch. The internship program is essential to UiTM Sabah's Diploma of Computer Science program. This project attempts to bridge the gap between academia, industry and increase the internship chances of computer science students by identifying their needs, expectations and concerns. A survey was distributed to the computing-related industries in the Sabah region. The study's conclusions will significantly impact the future of computer science education in Sabah. It is expected to provide recommendations for improving the internship program at the UiTM Sabah Branch and enhancing the employability of computer science graduates by assessing the challenges and opportunities for computer science internships. Furthermore, this study contributes to the existing body of knowledge on internship programs and their impact on student learning and employability, especially in Sabah. Overall, this research can assist academics, industry representatives, and policymakers in improving the quality of computer science education and ensuring that graduates are well-prepared for the job market's demands.*

Keywords: undergraduates, internship, willingness, employability, purposive sampling

1. Introduction

The Universiti Teknologi Mara (UiTM) is one of Malaysia's most prominent and oldest educational institutions. It has many campuses all over the country. The UiTM Sabah Branch is one of the locations. It is in Kota Kinabalu, Sabah, and offers many academic degrees in areas like business, engineering, applied sciences, and computer science (CS). The UiTM Sabah Branch is committed to giving students a top-notch education and the necessary skills and information to succeed in today's tough job market.

UiTM Sabah Branch started offering a Diploma in Computer Science program in 2021 so that its graduates could use their CS skills and understanding in various fields. The course covers theory and practice in computer networks, database management, programming, and software-making. As part of the Diploma of Computer Science program, students must work as interns for at least one term. During this time, students can implement what they have learned at university in the real world. Students may enhance their technical and non-technical skills, get real-world experience, and meet people in the field through internships (Kang & Girouard,

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2022). It is also thought that internships will help students get jobs by letting them learn about the company's culture, work ethics, and standards (Ismail et al., 2020). The program's internship component is critical because it gives students actual experience in a real-world job environment (Setiawati, 2023).

In 2024, the first batch of Computer Science students with a Diploma at UiTM Sabah Branch will start their internship. In this case, the institution will manage the internship placements for the first time. Because the program is new and the lecturers have not run anything like this before, they might initially feel a little lost. Furthermore, the institution may face challenges in effectively placing students with appropriate internship opportunities when there is insufficient data about the local industry sector. The university may have limitations in evaluating the internship program's efficacy and identifying areas for advancement due to inadequate data. The university may need to allocate additional resources to gather data on the local sector and create efficient student placement strategies. To provide a successful and fulfilling internship experience for the first group of Diploma of Computer Science students, the institution should adopt a collaborative approach, engage with the local industry, implement program management practices, and demonstrate adaptability in challenging situations.

Hence, this study addresses this issue by investigating local industry sectors' willingness to accept students with the Diploma in Computer Science from the UiTM Sabah Branch as interns and examining their main concern in participating in the program.

2. Background of the Study

2.1 Industry willingness to engage an intern

Willingness in the context of internships pertains to an organization's eagerness or preparedness to accommodate student interns for a specified duration, typically as a component of an academic program (Skujiņa & Loots, 2020). Various factors such as the perceived benefits of the internship program, resource availability, internal company policies, and the broader economic and cultural context, can impact an organization's willingness to accept interns (Pandita & Kiran, 2021; Tezel et al., 2021). Several studies have explored the factors that affect the industry's willingness and readiness to participate in internship programs. The organization's perceived benefits of the agenda are essential to examine. Industries that engage in internship programs aim to enhance partnerships with educational institutions, access a pool of talented students, and enhance their reputation and visibility in the community, as indicated by multiple research studies (Belinski et al., 2020).

Resource availability significantly impacts industry participation in internships. This could involve funding to pay interns and human resources to oversee and guide interns. Research indicates that industries with greater resources are more inclined to engage in internship programs and offer superior internship opportunities (Gashaw, 2019). Internal organizational regulations and procedures can impact their willingness to participate in internship programs. Some organizations may have rules prohibiting or discouraging the utilization of interns (Wong et al., 2021). On the other hand, certain organizations may have policies that promote or prioritize using interns to enhance their workforce's skills and capabilities (Gashaw, 2019).

The literature shows that industry readiness to participate in internship programs is influenced by factors such as the perceived benefits of the program, resource availability, and internal regulations and procedures. Educational institutions and policymakers can collaborate to create

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internship programs that cater to the needs of students and organizations, facilitating the integration of academic knowledge with practical skills.

2.2 What does an internship mean?

Internships, also called practical training in Malaysian higher education, are opportunities for students to gain practical job experience and apply their theoretical knowledge in a professional setting. Internships help students develop skills, acquire industry knowledge, and gain work experience to enhance their employability and career opportunities (Kroon & Franco, 2022). Internship programs can be remunerated or voluntary, vary in duration, format, and objectives.

Internships are becoming prevalent in various academic programs, particularly in CS programs. From the industries' perspectives, internship programs offer a cost-effective method of recruiting and training new talent while also enabling them to evaluate interns' potential as future employees (Kroon & Franco, 2022). The research also mentioned that internships can serve as a vital recruitment strategy for industries by aiding in identifying and training potential future employees, thereby enhancing retention rates. Hence, internships are advantageous for both students and employers. Internships offer students crucial experience and insight into the corporate world, enabling them to make informed career choices and gain a competitive advantage in the labour market (Zehr & Korte, 2020). Internships can help firms establish connections with institutions and tap into a talented group of students.

2.3 Internship programs at local universities in Malaysia

Several Malaysian universities, especially those that offer CS programs, provide internship programs as a component of their academic curricula. Certain colleges have established partnerships with firms to assist students in finding internships. Conversely, other programs expect students to secure their own internship placements. Research conducted by Noah and Aziz (2020) indicates that the majority of Malaysian higher institutions have established internship programs as a compulsory component for graduation, providing students with options for both domestic and overseas placements. The study found that these programs were often well-organized and gave students valuable industry experience and exposure. Universiti Sains Malaysia (USM) offers a top-notch internship program. Husain and Mahfoodh (2021) assert that the internship program at USM is well-organized and enhances a range of skills, including teamwork, communication, and problem-solving. USM collaborates with industry partners to provide students with practical experience in real-world settings, as noted by Majid et al. (2022). Universiti Malaysia Sarawak (UNIMAS) implements a "buddy system" where senior students provide mentorship and guidance to junior students throughout their internships (Lian et al., 2015). Universiti Teknologi Petronas (UTP) has created an "Industry Coordinators Network" to help students secure internship placements across different industries (Abd Manan & Alwi, 2020).

Internship programs at Malaysian institutions nevertheless encounter challenges despite their achievements. Challenges exist in collaboration between universities and industry partners, as well as the necessity for more comprehensive assessment approaches to assess program effectiveness (Kapareliotis et al., 2019; Singh, 2021). However, through consistent effort and collaboration, internship programs in Malaysian universities can significantly contribute to preparing students for successful careers in their chosen fields.

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3. Problem Statement and Research Objectives

Students in the Diploma of Computer Science program at UiTM Sabah Branch must complete a minimum of a semester of internship. The first batch of students will embark on their internships in mid-2024. However, it is unclear whether industries are willing to hire these students for internships and, if so, what criteria impact their decision. The faculty members do not have sufficient data on the local industry landscape to support them in managing the internship placement. This causes confusion for students and the university about the internship program's efficacy in attaining its goals. Furthermore, past research on internship programs in Malaysia has revealed various management concerns, including a lack of help for students locating internships, insufficient monitoring of internship quality, and inadequate evaluation of program effectiveness. These concerns may exist in the Diploma of Computer Science curriculum at UiTM Sabah Branch, affecting the quality and efficacy of the internship program.

This study aims to look into industries' willingness to engage CS students for internships as part of the Diploma of Computer Science curriculum at UiTM Sabah Branch. The research also intends to discover the elements that impact industries' decisions to participate in the program and investigate the obstacles and issues related to internship program management. The objectives of this research are:

1) To investigate the industry's interest in hiring CS students for internships as part of the Diploma in Computer Science curriculum at UiTM Sabah.
2) To identify the factors influencing industries' decisions to participate in the internship program.
3) To investigate the challenges or issues related to internship programs (from the industry's point of view).

The research questions that will guide this study are:

1) How interested are industries in hiring CS students for internships as part of the Diploma of Computer Science curriculum at UiTM Sabah Branch?
2) What factors influence industries' decisions to participate in the internship program?
3) What are the problems and issues faced by the industries related to managing the internship program?

4. Methodology

This study's data was gathered through an online survey. The actual sample size used was 173 respondents. The survey items are divided into four sections. The industry information was obtained from the Department of Statistics (DOSM) and Suruhanjaya Syarikat Malaysia (SSM). According to the SSM, the number of registered industries in Sabah as of June 2019 was 56,172. However, this number did not include the IT-based departments from the government sectors, which were also relevant to this study. Therefore, the population of industries in Sabah with at least one IT-based department or unit or IT-based personnel was estimated to be higher than 56,172. The survey employed a two-stage sampling method to select the respondents from this population. The first stage was purposive sampling, which aimed to ensure that the industries involved in the survey had at least IT-based department/unit or IT-based personnel. This was done to filter out industries irrelevant to the research objectives and increase the data's validity. The second stage was random sampling.

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The quantitative data from the survey were subjected to descriptive statistical analysis using SPSS 27.0 software. The investigation involved calculating the variables' simple relative frequencies, percentages, and relative means and presenting them in tables. The descriptive statistics also provided an overview of the sample characteristics, such as the number of respondents and industry type. The researchers manually analyzed the open-ended questions. The responses were categorized based on key terms such as "salary" or concerned issues such as "access to the latest technical knowledge and skills from the students." The researchers also identified keywords/themes and patterns in the responses. The analysis results were given in a table with the frequency and percentage of each category. The table also provided examples of responses from each category. The researchers noted that most respondents provided more than one response or answer to the open question, which indicated that they had multiple factors influencing their willingness to hire CS interns.

5. Findings and Discussion

5.1 Addressing RQ1: How interested are industries in hiring CS students for internships as part of the Diploma of Computer Science curriculum at UiTM Sabah Branch?

Table 1 shows that 81.9% of respondents from the government sectors said they planned to hire CS interns soon, while 18.1% said they had no plans to do so. On the other hand, all non-government sectors (100%) said they were planning to hire CS interns eventually. In answer to the question: Does your company currently offer an internship program for CS students? The table shows that the IT-based industry sector currently has the most companies giving internships in both the government (100%) and non-government (89.2%) sectors. It was also common for these companies to hire many interns—3.6 per year on average across both sectors. However, other sectors, like logistics, agriculture/plantation, and transportation, are not participating in CS-based internships. This could mean that these industry sectors did not think CS was important or valuable to their main core business or industry, or it could mean that the skills taught in universities do not match the needs of these sectors, highlighted by Asman and Aliyyah (2023). Peter et al. (2023) said that the differences in the need for CS skills across business sectors may also be due to the amount of digitalization and innovation in each sector. IT-based industries and others that rely on technology or new ideas are more likely to hire CS students.

On the other hand, industries/sectors that are not into digitalization might not think that CS skills are as necessary. Table 1 presents valuable details about the types of internships available to students in various industries and how often they happen. Knowing how many internships are available, how many people are looking for them, and what students and companies want and expect is also helpful.

Table 1: Industries' categorization and their past history with an internship program

`	Industry sectors	Does your organization have any plans to recruit a CS intern in the near future?	Frequency	Does your company currently offer an internship program for CS students?		If yes, how many CS interns do you accept per year?
				Yes (%)	No (%)	Mean
Government (72)	IT-based	Yes (81.9%)	19	100	0	3.6
	Education		21	90.5	9.5	2.3

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	Forestry	No (18.1%)	3	33.3	66.7	1
	Accounting		2	100	0	1
	Healthcare		6	100	0	2.7
	Administration		6	50	50	1
	Telecommunication		7	100	0	4.73
	Engineering		8	37.5	62.5	1
Non-government (101)	IT-based	Yes (100%)	37	89.2	10.8	3.6
	Logistic		2	0	100	NA
	Education		9	66.7	33.3	3.1
	Agriculture/plantation		3	0	100	NA
	Healthcare		3	100	0	1
	Finance		9	22.2	77.8	1.7
	Transportation		3	0	100	NA
	Commerce/retail		6	16.7	83.3	2.4
	Hospitality/tourism		14	35.7	64.3	2
	Telecommunication		15	60	40	3.7

5.2 Addressing RQ2: What factors influence industries' decisions to participate in the internship program?

Table 2 presents the internship time preferences of respondents, offering significant insights into industry norms and expectations. It provides valuable data regarding the distribution and preferences of internship durations. This information is beneficial for comprehending how the internship duration could impact the industries' contentment and consequences. Medium-term internships (3 to 6 months) are preferred by 73.1% of the sectors. Meanwhile, long-term internships (more than 6 months) were favoured by around 15.1% of respondents. According to the data, only 10.1% of respondents provide internships shorter than 3 months. Short-term internships appear to be less prevalent in the industries involved. This suggests that short-term internships are relatively less common among the participating industries. 1.7% of respondents indicated that the duration of internships might be influenced by students, allowing for flexibility or student-driven decision-making in setting the internship length. It emphasizes the significance of considering individual preferences and situations while creating internship arrangements (Lin & Anantharajah, 2019; Perusso & Wagenaar, 2023). These findings have potential implications for the involved industries and the UiTM Sabah Branch in several ways. It highlights the need to establish UiTM internship programs that align with industry demands. Students must have ample time to participate in internship experiences while meeting the criteria established by the organizations involved (Holtom & Inderrieden, 2006).

Table 2: Internship duration

What is the duration of the internship?	Less than 3 months	3-6 months	More than 6 months	Depending on the students
Frequency (%)	12 (10.1%)	87 (73.1%)	18 (15.1%)	2 (1.7%)

Table 3 shows the primary factors that impact industries' decision to hire CS students for internships, categorized by non-government and government sectors. The responses reveal the reasons behind company involvement in internship programs and offer an understanding of the advantages of recruiting CS interns. For survey question 1: factors influencing the decision to recruit CS students, the strong response from both sectors highlights the crucial requirement for more technical competence in industries. This highlights the necessity for skilled personnel who can support ongoing projects and meet specific technology requirements within companies. The high percentage of respondents from the private sector (92.1%) and the

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substantial responses from the government sector (81.9%) emphasize the crucial role of technical skills in encouraging corporate engagement in internship programs. This trend suggests a heightened emphasis on innovation and keeping abreast of technological advancements in non-governmental industries. Suchek et al. (2021) highlight the importance of continuous education and technological progress in private sectors to sustain competitiveness and foster innovation. The survey findings indicate a significant disparity in the receptiveness to fresh viewpoints and creative concepts, with a notably greater participation rate in the non-government sector (61.4%) compared to the government sector (38.9%). This conclusion aligns with Berkova et al.'s (2022) research, which highlights the significance of organizational culture in fostering creativity and innovation. Private sector industries seem to be more proactive in integrating diverse viewpoints from CS interns. This proactive stance acknowledges the benefits that diverse perspectives may bring to organizational problem-solving and innovation.

High response rates of 86.1% in the non-government sector and 80.6% in the government sector emphasize the significance of internships in talent acquisition and workforce development programs. This mutual recognition across several sectors underscores the importance of internships in cultivating and preparing the upcoming cohort of skilled individuals. Berkova et al. (2022) found that firms that promote diversity and encourage open communication are more inclined to access their employees' inventive capabilities. The higher response rate in the non-governmental sector may suggest that these industries have fostered an innovative atmosphere. These organizations show their dedication to using creativity as a competitive edge by aggressively seeking new perspectives from CS interns. Google, Apple, Microsoft, Petronas, and Amazon frequently hire undergraduate students for internships.

The non-government and government sectors acknowledge the significance of community service through internship programs, demonstrating a shared dedication to skill enhancement and providing students with essential practical experience. Both non-government institutions and government entities had a substantial response, with 65 (64.4%) and 51 (70.8%) reported, respectively, highlighting the significance of societal effect and community involvement in internship programs. Establishing partnerships with universities is crucial for businesses, especially in the public sector. Based on the findings, non-government entities accounted for 20 responses (20.8%) and government entities for 51 responses (70.8%). Collaboration with educational institutions is crucial for enhancing workforce readiness and promoting innovation through applied research and development initiatives. The results highlight the diverse advantages of internship programs, extending beyond individual skill enhancement to encompass broader societal engagement and collaborative information sharing between academia and industry. Emphasizing connections between the community and institution can provide a comprehensive strategy for developing talent and fostering innovation, resulting in long-lasting success (Urquía-Grande & Perez Estebanez, 2020).

Sectors strategically utilize human resources by recognizing internships as a cost-effective method to support ongoing projects, hence enhancing project success. This perception is prevalent in private and public sectors, although it is more pronounced in the latter. The results show that non-government entities reported 37 (36.6%) and government entities reported 35 (48.6%), demonstrating a broad acknowledgement of the effectiveness and significance of internships in project support activities. The focus on cost-effective project support likely stems from budget constraints and the necessity to enhance resource allocation in the government sector. Saleh et al. (2021) discovered that efficient resource management in government agencies is crucial for optimizing project outcomes and reducing costs. Conversely, the non-

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governmental sector may consider internships to be cost-effective. It may also correspond with factors like talent recruitment or community involvement (Rothschild & Rothschild, 2020).

In the private sector, workplace diversity is recognized by incorporating students from diverse backgrounds. Nevertheless, the responses from the government sector do not demonstrate this aspect, suggesting potential areas for enhancement in diversity efforts. Non-governmental organizations in Malaysia acknowledge and emphasize workplace diversity due to corporate social responsibility (CSR) initiatives and legislative laws. Embracing diversity aligns with CSR goals, demonstrating a dedication to social equity and equal chances (Yu et al., 2020).

For survey question 2, what skills and knowledge do you expect CS students to have before starting their internships? Most respondents from the non-government sector (91.1%) and government sector (83.3%) highlighted the importance of having strong programming skills. This highlights the significance of having strong programming skills in CS internships, which corresponds with the essential abilities required of students pursuing this field. Students' proficiency in software development methodology is acknowledged differently across industries. Approximately 22.3% of respondents from the non-government sector acknowledged the importance of the software development process in this survey. And around 13.9% of respondents in the government sector shared a similar viewpoint. There are multiple reasons why industries may not prioritize interns' knowledge in software development methodology compared to other skills. It could be prioritizing urgent technical skills and project outcomes rather than a comprehensive methodological comprehension (Bongomin et al., 2020). Industries may favour applicants who can promptly contribute to current technical-based projects and tasks, emphasising technical abilities in programming languages and tools (Hong et al., 2020).

While a smaller percentage of respondents from non-government sectors (17.9%) and government sectors (13.9%) reported being knowledgeable in data structures and algorithms. However, it is essential for CS students as it forms the foundation for algorithmic thinking and problem-solving. Research highlights the significance of foundational solid knowledge for CS students (Fisler, 2022; Krishnamurthi & Fisler, 2020). Nevertheless, participants highlighted the importance of web development tools, indicating the widespread use of web-based apps in contemporary digital environments. This increase aligns with the industry's increasing need for web development skills.

The finding revealed that most respondents recognized the importance of database management systems, with 91.1% in the non-government sector and 62.5% in the government sector acknowledging their significance. This highlights the need for effective data management in software development projects. Additionally, although fewer respondents mentioned it, expertise in version control systems like Git was considered essential by approximately 8.9% in the non-government sector and 6.9% in the government sector. This highlights the significance of backing collaborative software development and code management. Respondents in non-government and government sectors stressed the need for software testing and debugging skills, with approximately 86.1% and 77.8% stressing this aspect, respectively. It highlights the need to ensure software quality and reliability throughout development.

Almost all respondents, 96.0% in the non-government sector and 95.8% in the government sector highlighted the importance of interpersonal skills, including teamwork and communication. This emphasizes their crucial importance in fostering effective cooperation in software development projects. Moreover, the ability to adjust to new technologies emerged as

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a vital skill, highlighting the ever-changing character of the industry and the constant requirement for updating abilities. Approximately 50.5% in the private sector and 48.6% in the public sector stressed its importance. The finding also indicated most non-government respondents focused on networking and security ideas (approximately 79.2%). In contrast, fewer government sector respondents indicated varying cybersecurity awareness and networking priorities. However, a notable number of participants from both sectors emphasized the significance of artificial intelligence (AI) and machine learning concepts, with approximately 31.8% in the non-government sector and 41.6% in the government sector acknowledging their value.

The data found that most respondents in both the non-government sector (91.1%) and the government sector (90.3%) considered mobile application development skills necessary. This highlights the increasing need for mobile-focused solutions in the digital market and the significance of mobile application development expertise in the current technology landscape (Stocchi et al., 2022). The findings emphasize the broad range of skills required by CS students seeking internships. The individuals exemplify the varied nature of employment in the industry, where proficiency in various technical fields is essential for achievement. Educational institutions can better equip students for successful professional transitions by aligning internship programs with industry standards. This alignment guarantees that students are prepared to meet the industry's requirements and make valuable contributions to software development projects upon graduation.

Responding to survey item 3: What tasks and responsibilities do you expect CS students to perform during their internships? The findings showed notable differences between the government and non-government sectors. 91.1% of non-government respondents and 65.3% of government respondents reported that developing software applications was a significant responsibility expected of interns in both industries. This stresses the importance of practical software development skills earned through internships, consistent with CS education's realistic nature. In the same way, developing websites (96.0%) and mobile applications (91.1%) were considered a significant duty in the non-government sector. Also, developing sites (86.1%) and mobile applications (90.3%) were deemed significant duties in the government sector.

Interestingly, there was a slight difference between the two industries despite many respondents emphasizing the importance of interns' contributions to software testing, quality assurance, and issue debugging. Approximately 74.3% of respondents in the non-government sector and 62.5% in the government agreed that this function was crucial. This could result from diverse industries allocating resources or priorities to quality assurance procedures. However, duties like participating in meetings, researching new technologies, and contributing to projects were prioritized less, especially in the government sector. Even though these tasks are essential for encouraging creativity and teamwork in software development projects, their low priority indicates that internship programs could improve, especially in exposing students to various tasks and encouraging active participation in project discussions and contributions.

All things considered, the results show how many different tasks and obligations CS interns must complete throughout their internship. By taking part in these events, interns get practical experience and contribute to real-world projects, which enhances their skills and gets them ready for careers in the industry in the future. By better aligning their curricula and experiences with industry expectations, educational institutions and internship programs can increase the effectiveness of internships in preparing students for the workforce.

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Table 3: Factors influencing industries' decisions to participate in the internship program

Survey Items	Key-term responses	Non-government sector	Government sector
1. What factors influenced your decision to recruit CS students for internships?	Need for additional technical expertise/increased productivity	93 (92.1%)	59 (81.9%)
	Desire for fresh perspectives and new ideas from the interns	62 (61.4%)	28 (38.9%)
	Access to potential future employees	87 (86.1%)	58 (80.6%)
	Access to the latest technical knowledge/talent pool	55 (54.5%)	5 (6.9%)
	Contribution to the community through internships	65 (64.4%)	51 (70.8%)
	Building relationships with universities	20 (20.8%)	51 (70.8%)
	Cost-effective support for projects	37 (36.6%)	35 (48.6%)
	Workplace diversity by including students from varied backgrounds.	12 (11.9%)	0
2. What skills and knowledge do you expect CS students to have before starting their internships?	Strong programming skills	92 (91.1%)	60 (83.3%)
	Software development methodologies	25 (22.3%)	10 (13.9%)
	Data structures and algorithms	20 (17.9%)	10 (13.9%)
	Web development technologies	97 (96.0%)	60 (83.3%)
	Database management systems	92 (91.1%)	45 (62.5%)
	Version control systems	10 (8.9%)	5 (6.9%)
	Software testing and debugging	87 (86.1%)	56 (77.8%)
	Team collaboration skills	97 (96.0%)	69 (95.8%)
	Communication skills	97 (96.0%)	69 (95.8%)
	Adaptability to new technologies	51 (50.5%)	35 (48.6%)
	Networking and security concepts	80 (79.2%)	22 (30.6%)
	AI and machine learning concepts	32 (31.8%)	30 (41.6%)
	Mobile application development	92 (91.1%)	65 (90.3%)
3. What tasks and responsibilities do you expect CS students to perform during their internships?	Software application development	92 (91.1%)	47 (65.3%)
	Website development	97 (96.0%)	62 (86.1%)
	Mobile application development	92 (91.1%)	65 (90.3%)
	Research on new technologies	20 (17.9%)	5 (6.9%)
	Software issue troubleshooting	75 (74.3%)	45 (62.5%)
	Software testing and quality assurance	75 (74.3%)	46 (62.5%)
	Meeting participation and project contribution	75 (74.3%)	32 (44.4%)
	Technical documentation creation	66 (65.3%)	35 (48.6%)
	Technical support and Training	66 (65.3%)	35 (48.6%)
	Data entry	5 (4.5%)	0

5.3 Addressing RQ3: What are the problems and issues related to managing the internship program?

The study results indicate industries' concerns and challenges while establishing CS internship programs, offering valuable insights into areas requiring attention and enhancement (Table 4). The challenges of acquiring interns with the required and correct skills have significant implications for industries participating in internship programs. The large differences in the percentage of respondents stating worries between the non-government sector (72.3%) and the government sector (17.6%) demonstrate the issue's urgency, especially within non-

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governmental sectors. This finding suggests a difference between the skills acquired by interns from academic programs and those needed in industry environments.

Roughly 23.5% of non-government and 11.8% of government respondents identified internship availability in particular locations as an obstacle. Differences in educational opportunities and resources in various regions may be causing this issue, highlighting the need for efforts to promote fair access to internships (Belinda, 2023). Another significant concern was the time and effort needed for training and supervision, with around 34.7% of respondents in the non-government sector and 11.8% in the government sector expressing concerns. This highlights the resource-intensive aspect of intern training and mentorship programs, stressing the importance of efficient onboarding processes and supporting mentorship frameworks (Berková et al., 2022).

39.6% of respondents in the non-government sector and 5.9% in the government sector expressed a lack of clarity on expectations and roles. To enhance the internship experience, interns and supervisors should improve communication and define their tasks more clearly, as Urquía-Grande and Perez Estebanez (2020) highlighted. A lack of financing and resources for intern programs was a significant challenge, with around 81.2% of respondents in the non-government sector and 86.1% in the government sector experiencing the same issue. This highlights firms' financial limitations while operating internship programs and the importance of obtaining adequate resources to effectively sustain internships. Approximately 69.3% of respondents in the non-government sector and 58.3% in the government sector expressed concerns regarding the dedication and reliability of interns. This may indicate concerns over interns' dedication to their tasks and the potential influence on project results, underscoring the need to choose interns with a strong work ethic and commitment to their duties.

The findings emphasize industries' complex concerns and challenges while operating CS internship programs. Urquía-Grande and Perez Estebanez (2020) stress the significance of utilizing technology-driven platforms to connect interns with suitable employers according to their talents, as the matching process might be complicated. Offering extensive assistance and resources, like mentorship and opportunities for professional growth, during internships enhances interns' educational achievements. It readies them for successful career shifts (Lin & Anantharajah, 2019). Establishing explicit norms and expectations for interns and firms fosters transparency and mutual understanding, leading to a positive and productive internship experience for all involved (Turner, 2023). Governments, industries, and academic institutions must collaborate to solve these issues by ensuring that internship programs are appropriately resourced, well-structured, and aligned with industry demands. Addressing these challenges enables companies to enhance the quality and efficiency of customer service internship programs, benefiting both interns and the industry.

Table 4: Challenges faced by the industries in running CS internship programs

Survey Items	Key-term responses	Non-government sector	Government sector
What are the challenges of hiring CS interns for your company?	Difficulty finding interns with the required skills	73 (72.3%)	15 (17.6%)
	Limited availability in certain regions	20 (23.5%)	10 (11.8%)
	Time and effort for Training and supervision	35 (34.7%)	10 (11.8%)
	Lack of clarity on expectations and roles	40 (39.6%)	5 (5.9%)
	Limited resources and budget for the intern program	82 (81.2%)	62 (86.1%)

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	Difficulty integrating interns into company culture	5 (5.9%)	0
	Concerns about intern commitment and reliability	70 (69.3%)	42 (58.3%)

6. Conclusions

This investigation has revealed how willing industries in the Sabah region are to recruit CS student interns from the UiTM Sabah Branch and their concerns about an internship program. However, it is essential to note that this study has some limitations. The first problem is that the results come from data that industry participants gave themselves, which could be biased or wrong. Also, the study only looked at the Sabah area, so the results are not as relevant in other situations. Researchers should look into interns' experiences in the future to learn more about their points of view and the problems they face during the internship. Longitudinal studies looking at interns' careers after the job may also give us essential information about how the programs affect students' professional growth.

To improve CS internship programs, universities or higher institutions should spend more resources on technology-based matching systems, increase mentorship and professional development activities, and build strong lines of relationship between universities and industries. Stakeholders must keep talking and working together to improve job programs and deal with new problems in the quickly changing field of CS (Bile Hassan et al., 2021). Universities and industry partners may be able to get the most out of CS internship programs by using these strategies and encouraging a mindset of innovation and teamwork. This will help students, businesses, and the community as a whole.

This study is critical because it identifies issues the UiTM Sabah Branch may encounter while running its CS internship program and suggests ways to improve it. Collaborating with academic institutions and industries to look into graduates' skill sets could assist UiTM Sabah Branch CS students in securing internships or employment opportunities. From this study, the faculty assembled a database of industries ready to participate in the internship program. This database will make managing and facilitating internship tasks much more manageable. This will benefit both students and industry partners.

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