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Analysis of Student Demand Trends for Internship Placement in the Civil Engineering Program

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ABSTRACT

Well-structured internship programs play an important role in outcome-based education (OBE) for engineering programs. OBE emphasizes the importance of aligning educational practices with measurable outcomes that internships enhance students' lifelong learning potential by developing critical skills such as problem-solving, teamwork, and communication. However, identifying and meeting the specific internship placement needs to address those outcomes remains a challenge, where students' expectations for hands-on experience in the field and the availability of industry placements that disconnect with their academic background. This study focuses on the various industrial types and sectors in providing meaningful work experiences for civil engineering diploma students. The analysis was performed on graduated students' cohort September 2019 consisting of 121 students and 51 students from cohort 2020. The findings indicated that students preferred to complete their internship in northern region (Perak, Kedah and Pulau Pinang). most students favor completing their internship process with Contractor, likely due to the abundance of opportunities and the practical nature of the work, followed by Federal Government Department/Statutory Body and Consultant. Finally, the gender disparity is shown, where male students dominating private contractor for both type and sector, while female students are giving a competitive number for Federal Government/Statutory Body.

Keywords: Industrial internship; OBE; civil engineering

INTRODUCTION

Industrial training or internship entails the placement of students within an organisation to engage in supervised practical training in designated industries, either domestically or internationally, for a specified duration prior to the conferment of a certificate, diploma, or bachelor's degree (Kementerian Pengajian Tinggi 2010). The internship programs, also known as experiential learning, have been used by higher education institutions as a vital curricular option to meet industry demands (Baert et al. 2021). Nevertheless, internship should not merely be seen as a curricular requirement; it is an invaluable instrument for equipping students with the knowledge, abilities, and experiences necessary to cultivate more competent engineers for the industry (Azmi et al. 2019). Moreover, internships have demonstrated efficacy in aiding students to establish their career trajectories by enhancing their self-awareness and immersing them in authentic work environments (Alawamleh & Mahadin 2022).

The increasing demand for practical experience among civil engineering students highlights the importance of industry internships as a critical component of their academic and professional development (Ozek 2018). They provide a bridge between the academic and professional worlds, allowing students to engage in meaningful work experiences that enhance their understanding of theoretical concepts and expose them to the realities of the workplace (Arthur & Koomson 2022). However, identifying and meeting the specific internship placement needs of these students remains a challenge. There is often a disconnect between students' expectations for hands-on experience in the field and the availability of industry placements that align with their academic background and career aspirations. Without a clear understanding of student demand trends, educational

institutions may struggle to secure sufficient and relevant internship opportunities, potentially limiting students' exposure to essential real-world skills and professional networking.

Furthermore, industry placements in civil engineering are highly competitive (Zainal et al. 2023), and many companies may have limited capacity or specific criteria for selecting interns. This can result in some students facing challenges in obtaining relevant placements that align with their study areas or career goals. A comprehensive analysis of student demand trends for internship placement in civil engineering could provide valuable insights into the specific needs and expectations of students, enabling institutions to develop strategic partnerships with industry stakeholders. By addressing this gap, educational institutions can better support students in gaining meaningful industry experience, enhancing their employability and readiness for the civil engineering profession.

This study on analyzing student demand trends for internship placement in the civil engineering program provides valuable insights that can significantly enhance educational and industry alignment. By understanding the specific needs and expectations of civil engineering students regarding internship opportunities, educational institutions can more effectively tailor their internship placement strategies, ensuring a better match between students and industry requirements. The industrial training placement must be meticulously structured to provide interns with enhanced possibilities to acquire pertinent practical experience and information, while also fostering the development of their interests through the training (Abdul, 2022)

Additionally, the findings from this study can strengthen collaborations between educational institutions and industry partners. By highlighting demand trends, such as preferred fields of specialization, location, or internship duration, companies can more strategically plan and expand their internship programs to attract qualified students. This mutually beneficial partnership enhances the quality of internship experiences and ensures a steady pipeline of skilled graduates who meet industry standards. Ultimately, this study promotes a more structured approach to internship placements, benefiting students, educational institutions, and industry stakeholders alike by fostering a more prepared and adaptable future workforce in civil engineering.

It is also in line with outcome-Based Education (OBE), where OBE emphasizes the importance of aligning educational practices with measurable outcomes, as highlighted by Duncan et al. (2017) and (Zhang et al. 2022). Saha et al. (2023) and Nogueira et al. (2021) further emphasize that internships enhance students' lifelong learning potential by developing critical skills such as problem-solving, teamwork, and communication. These teamwork skills and management skills are very essential in preparing the students for the work environment, expanding the career opportunities and prospects (Mohammad Yusoff et al. 2022). Internships are particularly significant in engineering education, where the integration of practical experience with academic learning is essential for preparing students to meet the demands of their future careers (Abdelaty & Shrestha 2019). By immersing students in professional environments, internships enable them to apply theoretical concepts, refine technical skills, and gain insights into the practical aspects of their field (Thomson 2020) (Anderson et al. 2011).

According to Guler and Mert (2012), internships help students develop the ability to cope with challenging tasks in real-world scenarios, preparing them for the diverse and dynamic nature of engineering projects. To truly experience civil engineering authentically, students must be immersed in project environments where their explicit core engineering knowledge is tested and influenced by a tacit understanding of the practical realities of civil engineering practice (Tennant et al. 2018).

The location of internship placements, year, student gender, and type of industry sector are essential factors in analyzing student demand trends for internship placements in the Civil Engineering Program as they provide a comprehensive view of student preferences and industry alignment. Location reveals regional variations in demand, showing where students prefer to intern based on proximity, cost, or opportunities in specific states, which can inform institutions about high demand areas and potential partnerships with local industries. Year plays a crucial role as demand for certain industry sectors or regions may shift over time due to economic conditions, curriculum changes, or industry trends. Tracking demand by year helps identify patterns and anticipate future needs. Gender analysis offers insights into diversity in civil engineering internships, highlighting if certain industry sectors or locations are more appealing to male or female students, which can guide initiatives for balanced representation. Lastly, industry types and industry sectors are vital as it identifies the areas of civil engineering students are most interested in, whether consultancy, construction, or public sector roles. Understanding these trends helps academic institutions align internship offerings with student interests and industry demand, enhancing internship placement success and relevance.

METHODOLOGY

DATA COLLECTION

The data for this study was collected from Civil Engineering Studies, Universiti Teknologi MARA Cawangan Pulau Pinang website. This platform is actively used by students for internship placement registration and assessment submission, appointed faculty supervisors use the website for student information and assessment evaluation. Figure 1 shows the website interface and webpage dropdown for student internship (red box) on the website while Figure 2 displays the information provided by the student during internship registration period.

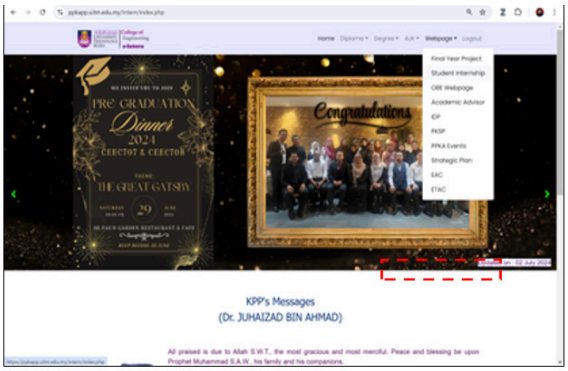

FIGURE 1. Website interface
(Source: https://ppkapp.uitm.edu.my/intern/index.php)

FIGURE 2. Example of student registration information
(Source: https://ppkapp.uitm.edu.my/intern/intern-dip-list-all.php)

SEMESTERS FOR STUDENT'S INTERNSHIP

In this study, from two students' cohort were used to obtain a comprehensive and representative sample of civil engineering students' internship experiences over an extended period. By focusing on recent academic periods, the study captures current trends and practices in internship placement and makes the findings relevant and actionable for improving educational strategies.

Limiting the study to two cohort also optimises resource management and makes the study more feasible and manageable in terms of time, funding and personnel. This targeted approach enables a detailed analysis of the direct impact of internships on students' educational outcomes and career preparation. This provides valuable insights for curriculum development and improving the overall educational experience for future students.

The analysis focuses on the cohorts of September 2019, consisting of 121 students, and 2020, consisting of 51 students as shown in Table 1. These students were given the autonomy to select their internship placements, allowing them to pursue opportunities that align with their interests and career goals. Upon acceptance by the companies, students were required to register their internships in the faculty database, ensuring that all relevant information was documented for future analysis. The internship duration was set at 17 weeks and 3 days, typically commencing in the October academic semester each year.

TABLE 1. Distribution of Student according to cohort

Cohort	Number of Student	
	Male	Female
2019	56	59
	3	3
2020	36	15

PROCESS OF STUDENT'S PLACEMENT

The student internship process flow for the civil engineering diploma programme is shown in Figure 3. The process flow for securing a placement began with the application for the placement (Section A), followed by the application for a placement, where students applied for approval and allocation to specific placements. Once an internship was found, the student's acceptance of the offered internship would be confirmed. Finally, the process was completed with the confirmation of acceptance by the industry, which ensures that both the student and the host industry have agreed to the terms of the internship, thus formalising the agreement.

During the internship (Section B), the process began with the verification of the student's report duty, ensuring that the student had begun the assigned tasks. The students

then prepared a logbook to document their daily activities and learning experiences, followed by the preparation of comprehensive reports detailing their progress and accomplishments.

To ensure quality and provide guidance, appointed faculty supervisors conducted monitoring visits or video calls. Students' performance was assessed by the industrial supervisor, who evaluated their practical skills and contributions. Finally, an assessment was conducted by the faculty supervisor that incorporated feedback from both academic and industrial perspectives to provide a holistic assessment of the student's internship experience.

The evaluation of grades by the coordinator (Section C) related to the internship process included a comprehensive assessment based on several criteria collected throughout the internship. These included compliance with the duties set out at the beginning of the internship, the quality and thoroughness of logbook entries and the depth and clarity of reports produced. The faculty supervisors also considered feedback from the lecturers, who followed the students' progress via video conference, and the internship supervisor, who practically assessed the student's performance. By synthesising these various contributions, the faculty supervisors determined a final grade that reflected the student's overall engagement, learning outcomes and professional development during the placement.

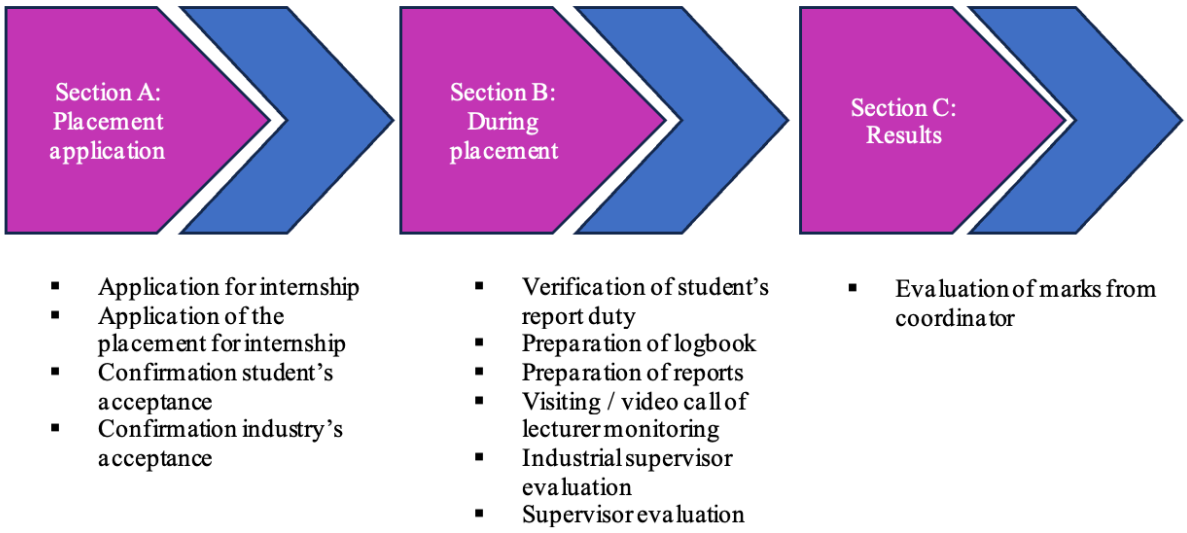

FIGURE 3. Process flow of the students' internship

PLACEMENT OF STUDENT FOR INTERNSHIP PLACEMENT

The choice of internship placement was closely related to the students' areas of interest and career aspirations. Students often choose internships that align with their academic programme and career goals and seek internships in regions known for certain industries or specialties or that are close to their hometown. The students were more engaged and performed well in an environment that matches their interests.

In this study, eight states were selected for the internships. They were Pulau Pinang (Penang), Kedah, Perak, Perlis, Selangor, Wilayah Persekutuan Kuala Lumpur, Kelantan and Terengganu. They were depicted as in Table 2. The internships were selected according to the students' interests. Some reasons were that the student was interested in large infrastructure projects in a metropolitan area with active construction projects, while another, interested in sustainable engineering, chose a location known for green building initiatives.

TABLE 2. States of internships for students and their designation

States	Designation
Kedah	KDH
Perak	PRK
Perlis	PLS
Pulau Pinang	PNG
Selangor	SGR
Wilayah Persekutuan Kuala Lumpur	WPKL
Kelantan	KTN
Terengganu	TRG

INDUSTRY TYPE FOR INTERNSHIP

There were six different industries for the students' internship. The industries were linked to the programme of the Diploma in Civil Engineering. The six industries were consultants, contractors, property developers, federal government department, local authority, and supply operator as depicted in Table 3. The six industries associated with the Diploma in Civil Engineering; consultants, contractors, property developers, federal government departments, local authorities, and supply operators which offer diverse and comprehensive experiences for students' internships. Consultants provide expertise in project design and planning, allowing students to apply theoretical knowledge to real-world scenarios and develop skills in engineering analysis and software use. Contractors, responsible for the hands-on construction work, give interns practical exposure to site operations, project management, and safety practices, showcasing the transformation of designs into physical structures.

Students in civil engineering often select internships in the developer sector because it provides practical, hands-on experience with project management, site operations, and construction processes. Working with developers enables students to see how design concepts are implemented in real-world settings, exposing them to the full cycle of a construction project—from initial planning to execution. This exposure is invaluable for understanding the technical, financial, and logistical challenges of project development, helping students apply theoretical knowledge to practical situations.

TABLE 3. Types of industries for placement and designations in the Civil Engineering Diploma Program

Industry types	Designation
Consultant	CNS
Contractor	CTR
Developer	DVL
Federal Government Department/ Statutory Body	FGD
Local Authority	LA
Supply Operator	SO

Interning within federal government departments or statutory bodies is another popular choice, as it gives students insight into the regulatory and compliance aspects of civil engineering. These agencies oversee public infrastructure projects, such as roads, bridges, and public buildings, allowing students to learn about the legal frameworks and standards that shape the civil engineering industry. Interns gain an understanding of large-scale projects that serve the public interest and may also participate in policy-related discussions, providing a foundation for those interested in regulatory or public-sector roles within civil engineering.

Working with local authorities and supply operators offers a unique perspective on public infrastructure and resource management. Internships with local authorities allow students to engage in urban planning, zoning, and community projects, which are essential for addressing local infrastructure needs. Meanwhile, internships with supply operators, such as utility companies or raw material suppliers, help students learn about the supply chain, resource allocation, and operational support required to keep construction projects on track. Together, these sectors provide students with skills in planning, logistics, and community-focused engineering, expanding their knowledge and employability in the civil engineering field.

ANALYSES

To investigate student demand trends for internship placement within the Civil Engineering Program, an analysis of the distribution of student internships across various industry sectors, states, gender, and years was conducted. By examining these factors, the study aims to understand the preferences and trends that influence students' choices for internship placements. This distribution analysis helps identify which industries, locations, and demographic factors attract the most students, providing a comprehensive view of where demand is highest. A clustered column chart was employed to represent these distributions visually, allowing for a clear comparison of trends and patterns across different categories, making it easier to interpret and analyze complex data.

Additionally, a focused analysis on the differences in internship placement percentages between the years 2019 and 2020 across various states was conducted. This comparison highlights how demand for internships has shifted over time, possibly due to factors like curriculum changes, industry needs, or evolving student preferences. To depict these percentage differences effectively, clustered bar charts were used, which allow for a side-by-side comparison of the changes in each state. This visualization technique provides a detailed look at the trends over time, helping to pinpoint any significant changes in student demand for internships and guiding future efforts to align educational opportunities with industry needs.

RESULTS AND DISCUSSION

DISTRIBUTION OF STUDENT INTERNSHIPS BY STATES

Figure 4 displays the percentage distribution of students originating from various states. The states represented include Kedah (KDH), Perak (PRK), Perlis (PLS), Pulau Pinang (PNG), Selangor (SGR), Wilayah Persekutuan Kuala Lumpur (WPKL), Kelantan (KTN), and Terengganu (TRG). Pulau Pinang and Kedah are the two states with the highest student origins, accounting for 31% and 30% of the total distribution, respectively. These two states together contribute more than half of the student population, indicating a significant concentration of students from these regions. Perak follows with 28%, which is significantly lower than Kedah and Pulau Pinang but still noteworthy compared to the other states. Selangor contribute 5% respectively, to the student population, while Wilayah Persekutuan Kuala Lumpur, Kelantan and Terengganu each account for 1%. Perlis contribution is slightly higher than some of the smaller states, standing at 3%, which suggests a modest representation of students from this state. Overall, the chart highlights a dominant representation of students from Pulau Pinang, Kedah and Perak, with other states contributing relatively smaller portions to the overall student population. This distribution suggests that a substantial number of students tend to choose internship placements near their place of origin or parents' house. Several factors contribute to this preference: proximity to family, which provides emotional support and reduces living expenses; the comfort and convenience of staying in familiar surroundings; and the availability of local industry opportunities, especially in economically developed states like Pulau Pinang. These considerations often lead students to favor internship locations near their homes, helping them balance professional development with personal well-being. This aligns with the idea that the availability of family support and the familiarity of surroundings play a crucial role in students' decisions regarding internship placements (Fisher, 2023).

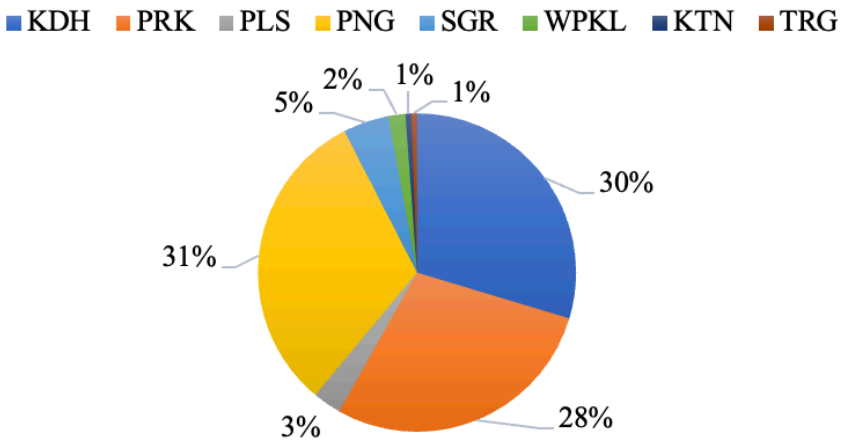

FIGURE 4. Distribution of student according to place of origin

Figure 5 depicts internship placements among students by cohort, showing a clear preference for placements in Kedah, Perak, and Pulau Pinang. The high number of placements in Pulau Pinang underscores the importance of a stable economic environment of local industries opportunities (Gebeyehu & Berhan 2018) and strong educational-industry linkages (Jain et al. 2023) in providing internship opportunities. These factors not only make certain regions more attractive for internships but also support the overall career development of students by offering practical work experience in a conducive environment. Kedah and Perak also show significant internship placements, likely for similar reasons. Moreover, local educational institutions in these states may have developed their own networks with regional businesses, contributing to the availability of internships.

The percentage difference in student distribution between 2019 and 2020 across various states is shown in Figure 6. Kedah shows the most significant negative difference, indicating a decrease in student placements in 2020 compared to 2019. On the other hand, states like Pulau Pinang and Selangor display positive percentage differences, suggesting an increase in placements from 2019 to 2020. Other states show smaller fluctuations, indicating minimal changes in student distribution over this period.

The percentage differences between 2019 and 2020 likely reflect variations in industry demand and student preferences. Higher placements in Pulau Pinang and Selangor suggest strong industrial growth and diverse opportunities, attracting more students, while the decline in Kedah may indicate limited internship options and fewer industry connections.

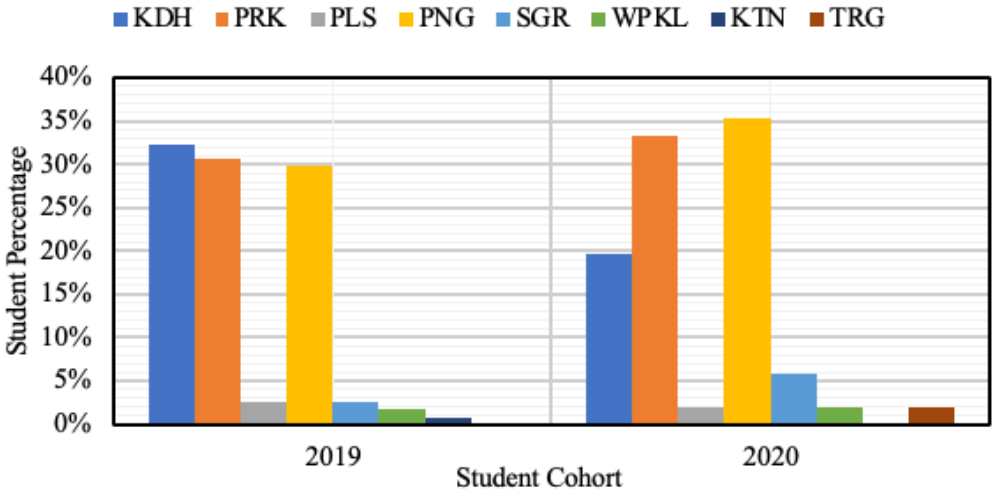

FIGURE 5. Comparison of student internship placements by states in 2019 and 2020 for Civil Engineering

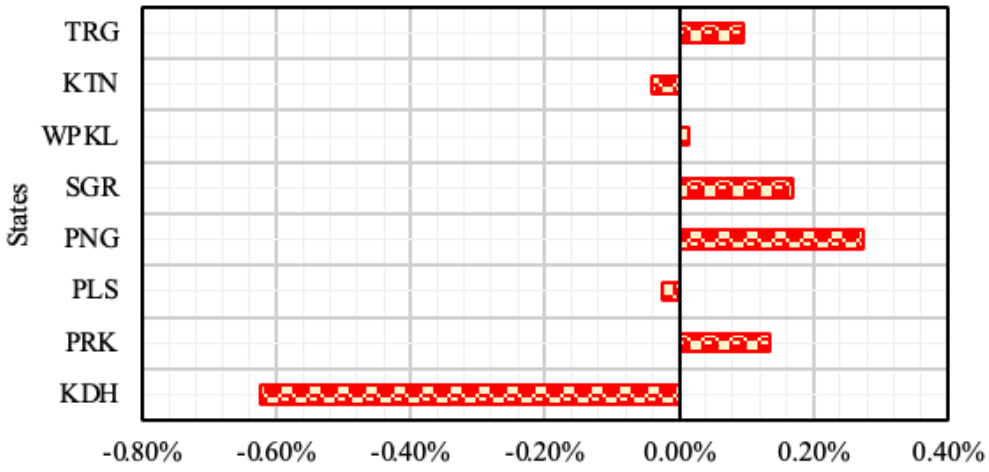

FIGURE 6. Percentage difference in student distribution between 2019 and 2020

DISTRIBUTION OF STUDENT INTERNSHIPS BY INDUSTRY TYPES

In the Civil Engineering program, students selected seven popular industry sectors for internships: Consultant (CNS), Contractor (CTR), Developer (DVL), Federal Government Department/Statutory Body (FGD), Local Authority (LA), and Supply Operator (SO). These sectors offer diverse learning environments that align with students' academic and professional interests, providing exposure to key areas within civil engineering. Figure 7 illustrates the distribution of students across various industry types, highlighting the dominance of the Contractor, which accounts for 55% of the placements. This significant proportion suggests that the Contractor industry is the most attractive or accessible field for students, likely due to the abundance of opportunities and the practical nature of the work, which aligns well with the students' educational backgrounds and career aspirations.

The second largest segment is the Federal Government Department/Statutory Body, comprising 20% of the placements. This indicates a strong interest or availability in public sector opportunities, which may offer job security, structured career paths, and the potential for contributing to public service and community development.

Consultant positions account for 10% of the placements, reflecting a moderate interest in roles that The Developer sector follows with 9%, showing that a smaller yet significant group of students is inclined towards roles involving project planning and real estate development, which are critical in shaping urban landscapes and infrastructure.

Local Authority and Supply Operator positions are the least represented, at 4% and 2% respectively. The low percentage in the Local Authority sector could indicate limited availability of internship opportunities or a lesser appeal to students. Meanwhile, the minimal representation in the Supply Operator category suggests that either there are fewer positions available in this field or that students may not view it as a primary career choice.

Overall, the distribution of students by industry type reveals clear preferences and trends, with the majority gravitating towards the Contractor sector, likely due to its extensive opportunities and alignment with practical skills. The strong presence in the Federal Government sector suggests an interest in stable, public-oriented careers, while the lower numbers in Local Authority and Supply Operator roles highlight potential areas for growth and development in terms of internship opportunities and student engagement.

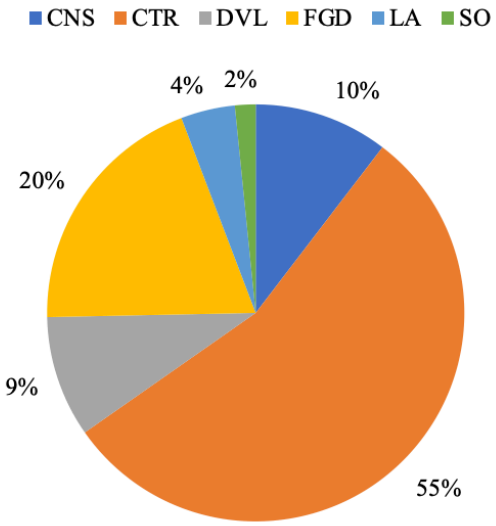

FIGURE 7. Student distribution across industry types for internship placement

Figure 8 presents a detailed distribution of students across three primary industry sectors: Private, Government, and Government-linked companies. A significant majority, 68% students were employed in the private sector, underscoring a strong preference among students for this domain. This preference for the private sector can be attributed to several factors including better compensation packages, a wide array of career opportunities, dynamic work environments, and the potential for rapid career advancement. These elements make the private sector particularly attractive for students eager to leverage their skills in a competitive and fast-paced setting. This finding was supported by Gordon et al. (2014).

In contrast, 30% of students were working in the government sector, which indicates its significant role in providing stable and secure job opportunities. Government positions are often seen as highly attractive due to the job security they offer, along with comprehensive benefits, and a stable work-life balance.

Only 2% of students were employed in government-linked companies. These positions typically offer a blend of public and private sector benefits, such as stability and good benefits combined with a degree of innovation and growth potential. However, the minimal representation in this category might suggest limited availability of such positions or a lesser appeal compared to the purely private or government roles. This could be due to a lack of awareness among students about the potential opportunities in government-linked companies.

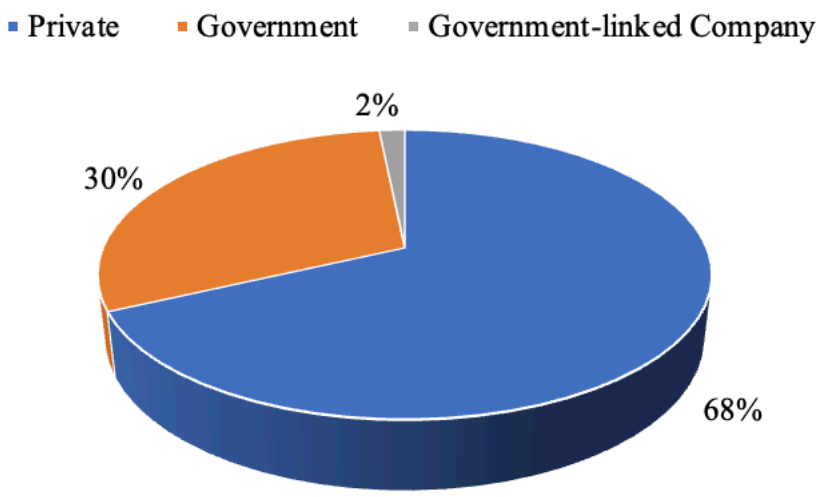

FIGURE 8. Student distribution of industry sectors

Figures 9 to 14 show the percentage distribution based on industry types in Kedah, Perak, Perlis, Pulau Pinang, Selangor, Wilayah Persekutuan Kuala Lumpur, Kelantan, and Terengganu. The data reveals significant variations in the distribution, with the Contractor consistently dominating several states as shown in Figure 10 and this finding is agreed by Singh & Rathi (2019). Selangor stands out with 24.42% of students working as contractors, indicating a robust demand for contractors in this economically vibrant state. This is followed by Perak (12.79%) and Kedah (13.37%), where the Contractor also holds a significant share. Pulau Pinang shows a more diversified distribution with the Federal Department and Contractor almost equally represented at 13% each. This suggests a balanced industrial landscape in Pulau Pinang, which is conducive to both public and private sector employment. Kedah and Perak similarly show substantial engagement in the Federal Department sector (Figure 12), with 13.37% and 12.79% of students respectively, indicating a strong government presence in these states. The Consultant sector (Figure 9), while not as dominant as the Contractor or Federal Department, still shows a noticeable presence in Selangor and Pulau Pinang. This aligns with these states' roles as commercial and industrial hubs where consultancy services are in demand.

Interestingly, Perlis, despite its smaller size, has a notable 1.74% of students in the Developer (Figure 11), highlighting some activity in real estate and infrastructure development. The Supply Operator (Figure 14) and Local Authority (Figure 13) are the least represented across most states, with minimal percentages indicating either limited opportunities or less interest from students in these fields.

Kelantan and Terengganu show very low student distribution across all industry types, with percentages below 1%, which might reflect fewer industrial activities or opportunities in these states. Similarly, Wilayah Persekutuan Kuala Lumpur, despite being a major urban center, shows relatively low percentages in each category, which indicates not many students applied for internship in these states.

The distribution of students across all industry types for internships is influenced by the students' backgrounds or hometowns. Higher placements in Perak, Pulau Pinang, and Kedah for sectors such as consultants, contractors, and federal departments indicate that many students come from these states, making them more likely to seek internship opportunities closer to home due to convenience, reduced living expenses, or familiarity with local firms. This trend suggests a preference among students to intern within or near their home regions, where they have stronger personal or academic connections.

Conversely, the low placement percentages in Perlis and Wilayah Persekutuan Kuala Lumpur suggest fewer students from these areas in the civil engineering program or a tendency for students from these locations to explore internships in other regions. The complete absence of placements in Selangor, Kelantan, and Terengganu for some industry types results from limited student representation from these states in the program, leading to fewer students actively pursuing local opportunities in those regions.

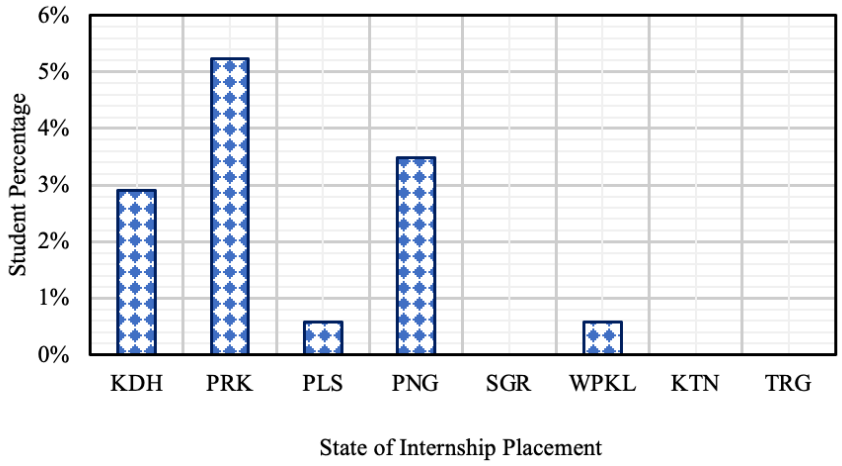

FIGURE 9. Percentage distribution of students in Consultant type internships by states

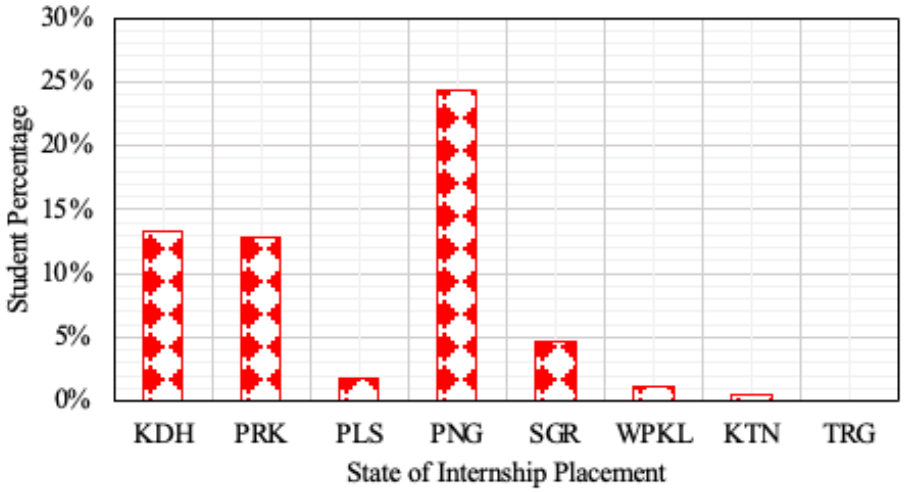

FIGURE 10. Percentage distribution of students in Contractor type internships by states

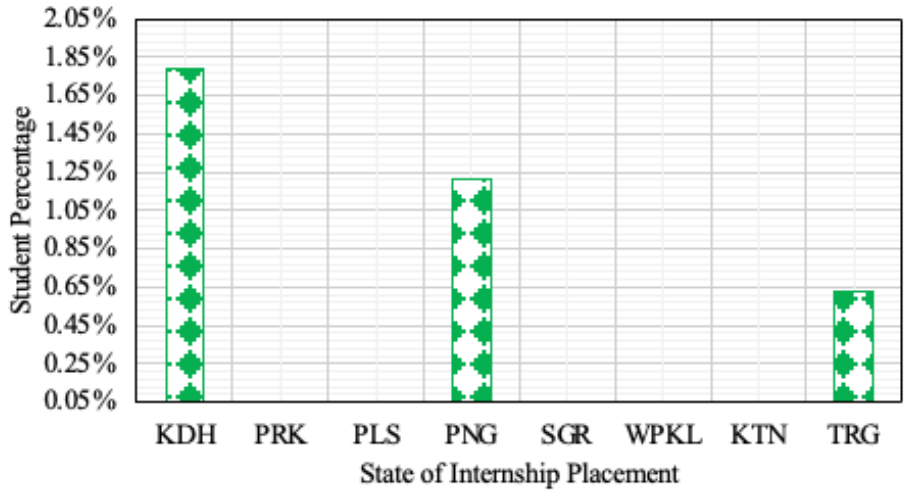

FIGURE 11. Percentage distribution of students in Developer type internships by states

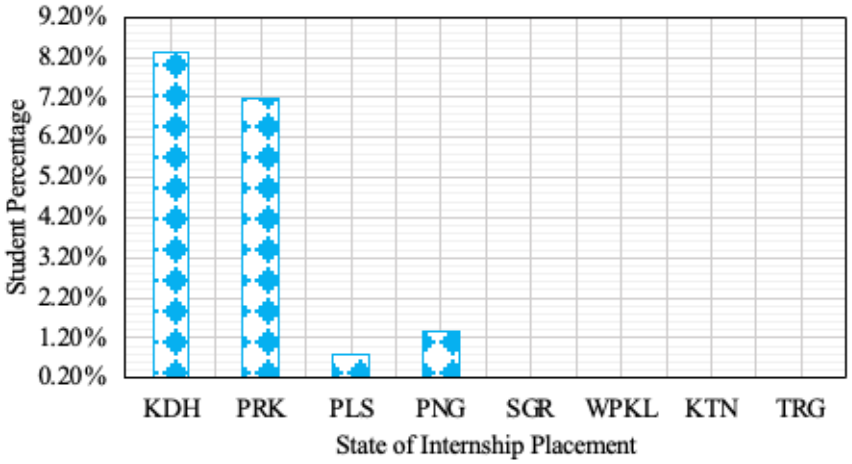

FIGURE 12. Percentage distribution of students in Federal Department type internships by states

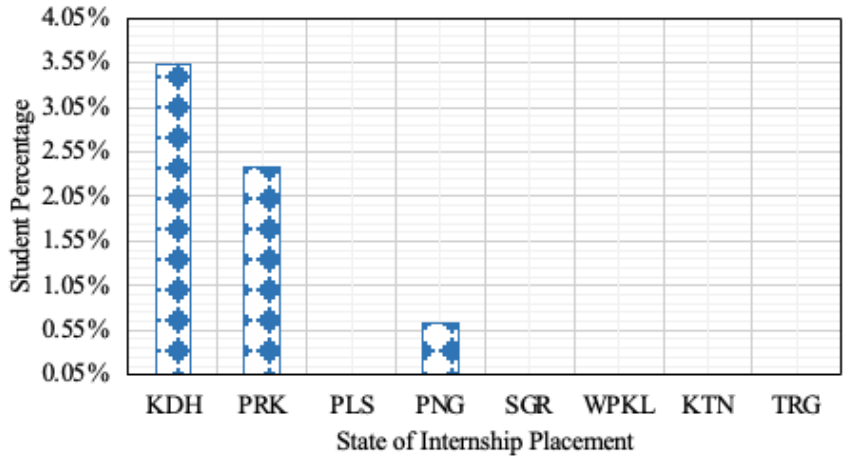

FIGURE 13. Percentage distribution of students in Local Authority type internships by states

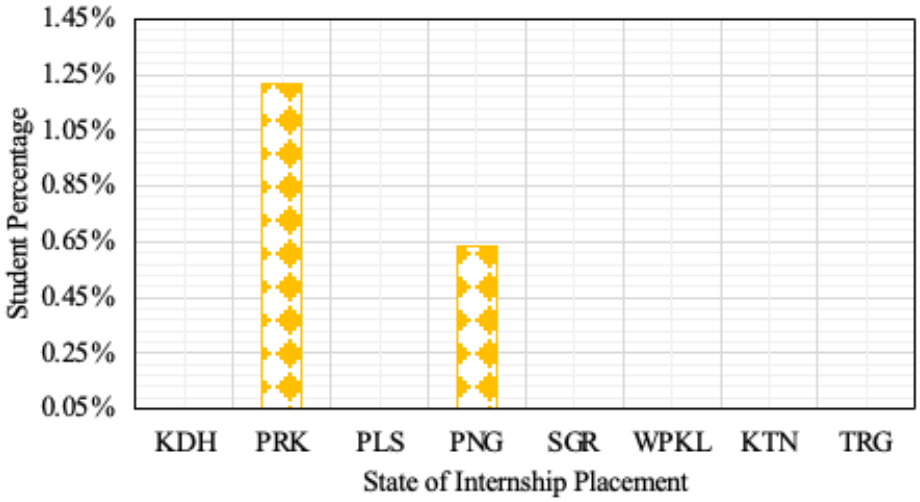

FIGURE 14. Percentage distribution of students in Supply Operator type internships by states

Figures 15 to 17 presents the student distribution across different industry sectors (Private, Government, and Government-linked Company) in various states. Notably, Pulau Pinang stands out with the highest percentage of students in the Private sector (Figure 15), reaching 30%. In contrast, states like Kedah and Perak show a more balanced distribution, with 18% of students in both the Private and Government sectors, and a negligible percentage in Government-linked Companies (Figure 17). Perlis has a notably lower percentage of students, with 2% in the Private sector and a minimal presence in the Government sector. Selangor follows, with 5% of students in the Private sector and an almost negligible presence in the Government sector. The Wilayah Persekutuan Kuala Lumpur, along with Kelantan and Terengganu, shows very minimal student representation across all sectors, each with around 1% in the Private sector. This distribution suggests that Pulau Pinang is a significant hub for students in the Private sector, while states like Kedah and Perak provide more opportunities across both Private and Government sectors. The minimal representation in Government-linked Companies across all states could indicate a limited focus or availability of such opportunities for students.

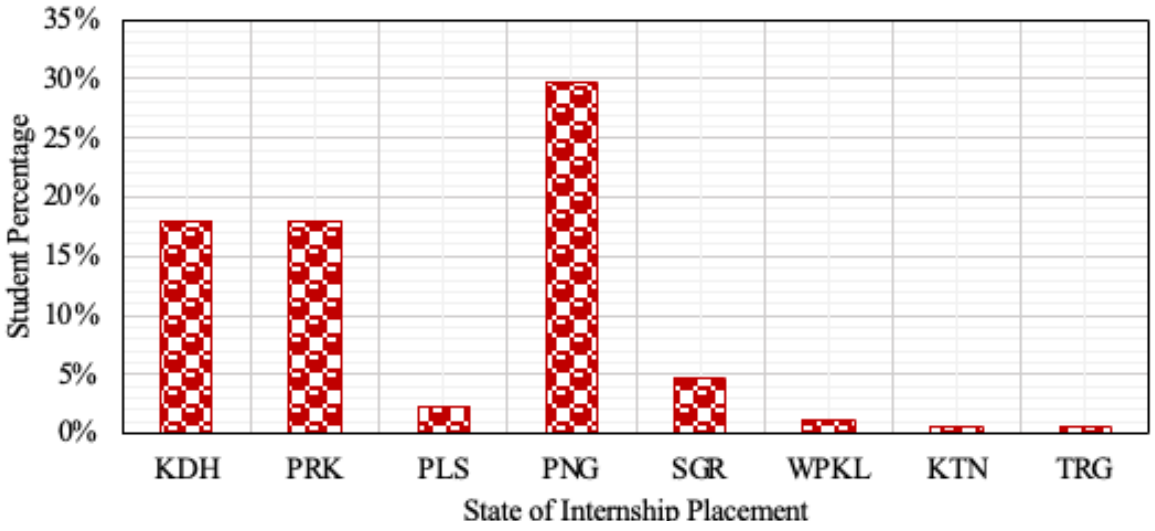

FIGURE 15. Student internship distribution in the Private sector

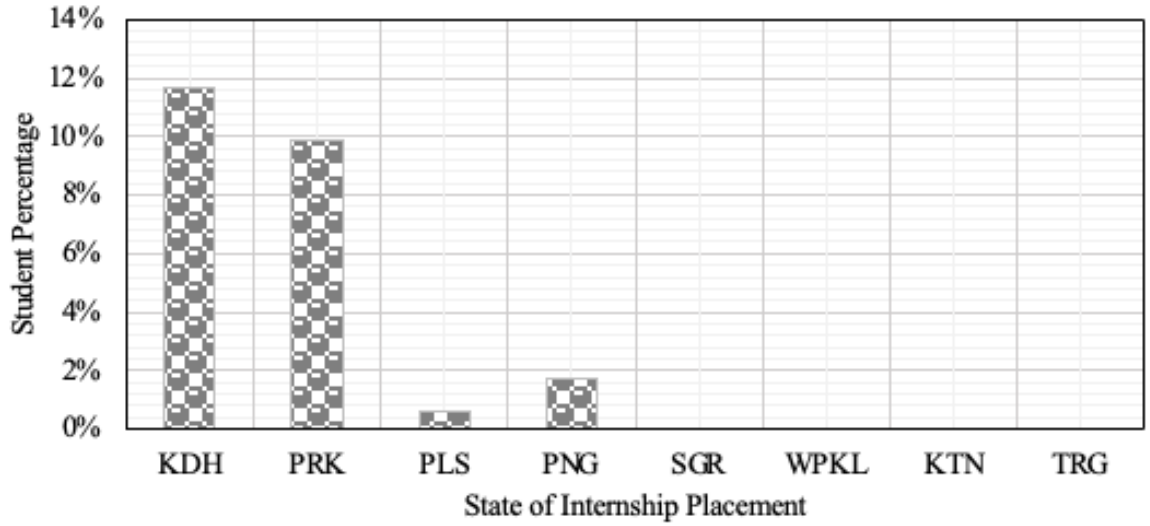

FIGURE 16. Student internship distribution in the Government sector

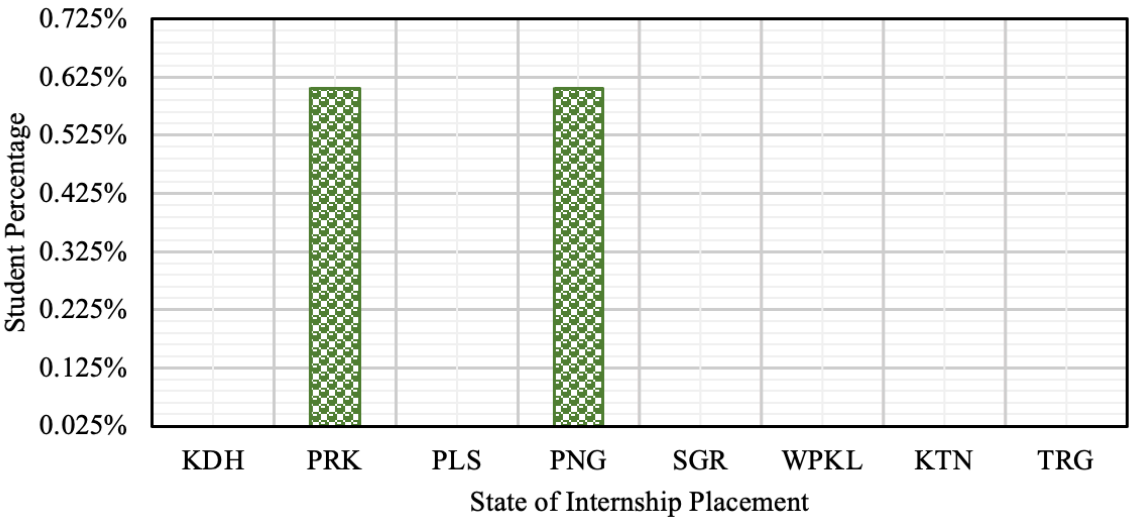

FIGURE 17. Student internship distribution in the Government-linked Company

Gender, both male and female, also plays an important role in industry placement. It is evident that there is a significant gender disparity across most of the roles, with male generally being more represented than female in 2019 and 2020 as shown in Figures 18 and 19, respectively. The Supply Operator role is exclusively occupied by male, with no representation of female. Similarly, Local Authorities and Federal positions also show a predominance of male employees, with female constituting only 22% and 32% respectively. On the other hand, the Contractor and Developer roles have a relatively more balanced gender distribution, though male still slightly outnumber female. In the Contractor role, female make up 47% of the workforce, which is the highest proportion of female in any category, whereas in the Developer role, female constitute 33%. Consultant roles also display a notable gender imbalance, with female accounting for only 35% of the workforce. This suggests that while female is present in all these occupational roles, their representation varies widely, and in some sectors, particularly in Supply Operators, there is a complete lack of female representation.

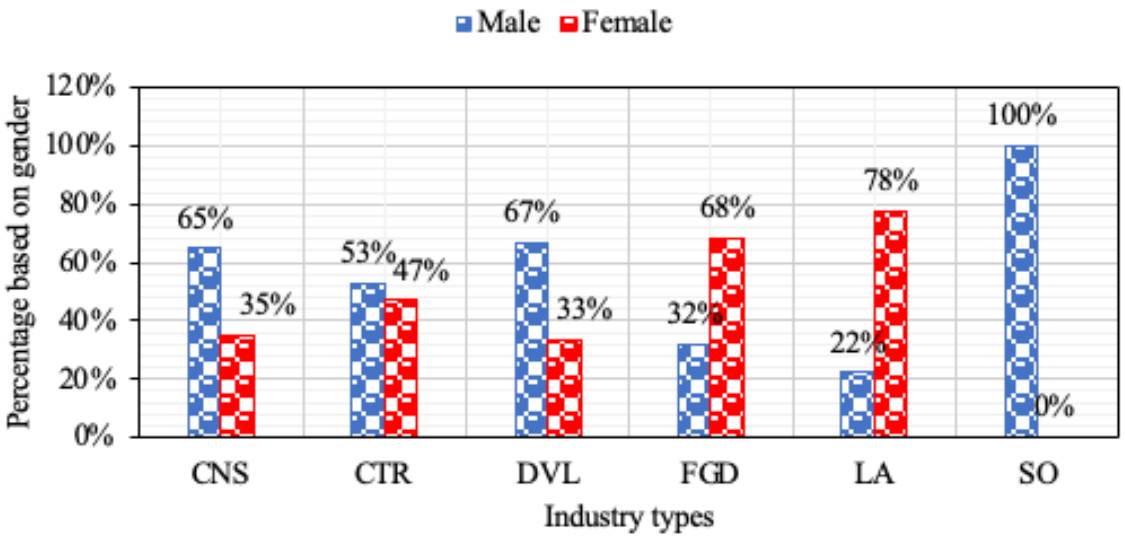

FIGURE 18. Student internship distribution by gender for industry types in 2019

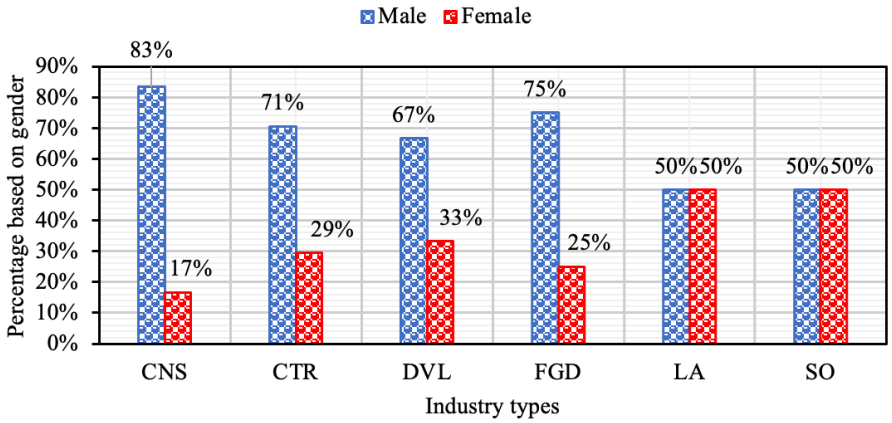

FIGURE 19. Student internship distribution by gender for industry types in 2020

As displayed in Figures 20 and 21, the gender distribution data from 2019 and 2020 across Private, Government, and Government-linked Companies reveals persistent gender imbalances, with some sectors showing more significant disparities than others. In 2019, the Private sector exhibited a relatively balanced gender distribution, though slightly skewed towards male (55% male to 45% female). By 2020, this sector saw an increase in the male student population, shifting to approximately 65% male and 35% female. This change suggests that while the Private sector was closer to achieving gender parity, there may have been factors in 2020 that disproportionately attracted more male students or deterred female students.

The Government sector showed a significant gender disparity in both years, with male consistently representing around 70% of the student population and female only 30%. This static distribution indicates a deep-rooted imbalance that remained unaddressed over the observed period. Factors such as traditional gender roles, societal expectations, and possible barriers to entry for women in government-related fields could be contributing to this persistent imbalance.

The most striking change occurred in the Government-linked Company sector. In 2019, this sector was heavily male dominated, with male making up approximately 90% of the student population. However, by 2020, the proportion of male students decreased to about 70%, while the proportion of female students increased to 30%. This shift suggests a positive trend towards gender diversity in Government-linked Companies, potentially reflecting successful initiatives aimed at encouraging female participation or a growing interest among female in these roles.

The overall analysis indicates that despite some progress, significant gender imbalances remain, particularly in the Government sector. The increase in female representation in Government-linked Companies is a positive sign, but the Private sector's shift towards a more male-dominated environment in 2020 is concerning.

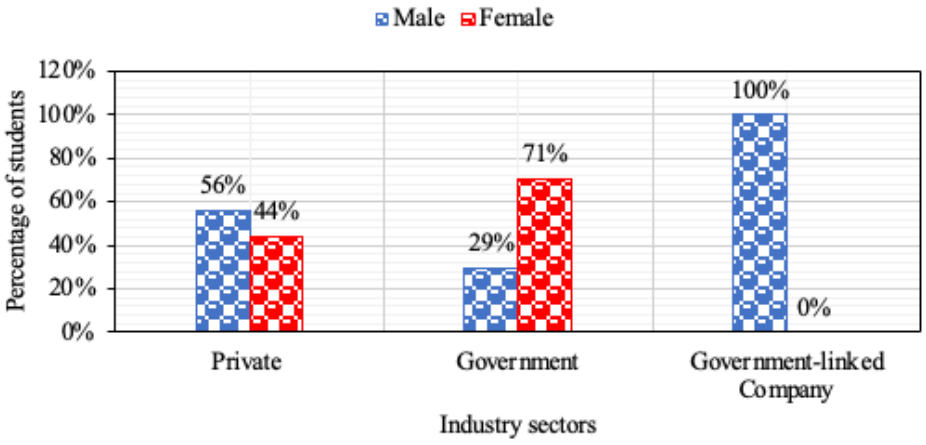

FIGURE 20. Student distribution by gender for industry sectors in 2019

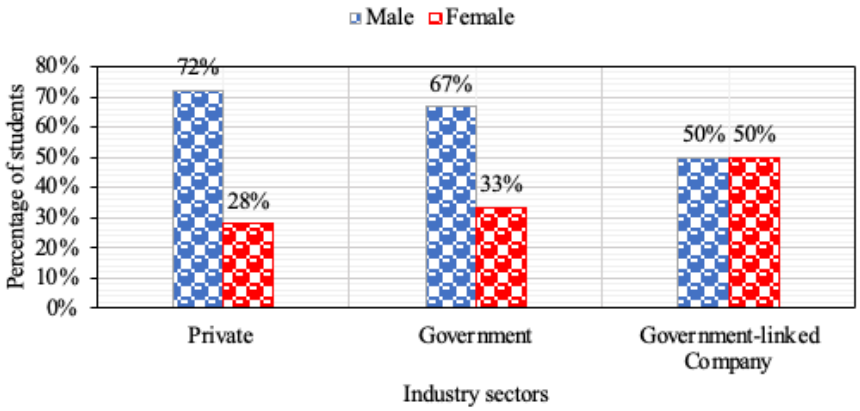

FIGURE 21. Student distribution by gender for industry sectors in 2020

CONCLUSION

This paper studied the trend in student demand for internship placements, specifically for Civil Engineering students of Universiti Teknologi MARA Cawangan Pulau Pinang. This study revealed that students preferred to gain their internship experiences in the organisations located in Pulau Pinang, Kedah and Perak because of the proximity to family and the availability of local industry opportunities, especially in economically developed states like Pulau Pinang. Other than that, most students favor completing their internship process with Contractor, likely due to the abundance of opportunities and the practical nature of the work, which aligns well with the students' educational backgrounds and career aspirations. This is followed by the Federal Government Department/Statutory Body and Consultant. These three main industry types chosen by the students reflect the practice of the organisations to give a good learning curve for the students in providing specialized knowledge and offer diverse project experience. In terms of industry sectors, most students preferred private organization sectors. The possible reason for this option is likely to be due to the simple application process as compared to the government's bureaucracy and attractive allowance rate that can be offered to the students. Finally, the gender disparity is shown, where male students dominating private contractor for both type and sector, while female students are giving a competitive number for Federal Govenrnment/Statutory Body.

Overall, the analysis of student trend demand for civil engineering programs in this paper has shown the preference for both 2019 and 2020 student cohort. On the other hand, although the overall results and findings have been successfully analysed and presented, there is room for improvement that the faculty can take into consideration to carefully designing and implementing internship programs to maximize their educational value. Some recommendations that can be highlighted are:

1. Given the preference for placements in Pulau Pinang, Kedah, and Perak, the educational institution could develop stronger partnerships with companies and organizations in other states, particularly contractors, government departments, and consulting firms. This collaboration can include regular engagement with industry players to align internship objectives with both academic and industry needs, ensuring quality learning experiences for students.
2. Since most students gravitate towards contractors, introducing mandatory rotation or shadowing programs in consulting and government organisations, or other organisations such as local authority and service provider can broaden their skill sets and understanding of various industry roles. This approach would give students a more comprehensive view of the industry, enhancing their adaptability and readiness for diverse career paths.
3. To address gender disparity, especially in roles within private contracting, the educational institution could implement targeted workshops and mentorship programs to support female students' confidence and preparedness for these roles. Partnering with industry associations to provide female mentors from contractor organisations could help bridge the gap and encourage female students to pursue diverse industry placements.
4. To ensure continuous improvement, the faculty should establish a system for gathering and evaluating feedback from students' post-internship. This feedback can inform future

collaborations, improve program quality, and better align placements with students' professional aspirations and academic growth.

The study faces several limitations, which may restrict generalization of the results. Some limitations that can be identified are:

1. This study primarily focused on preferences for Uiversiti Teknologi MARA Cawangan Pulau Pinang students, which may not fully represent internship trends for students in other regions. Results may not be generalizable to students in different geographic areas with varied industrial landscapes.
2. The study relied on data from the 2019 and 2020 student cohorts, which may not capture evolving trends in internship preferences over time, especially post-pandemic shifts or other recent industry developments. A larger sample across multiple cohorts could provide more robust insights.

In conclusion, the internship program for Civil Engineering students at Universiti Teknologi MARA Cawangan Pulau Pinang has proven to be an essential bridge between academic learning and practical industry application, helping students achieve targeted Outcome-Based Education (OBE) goals. Through hands-on experience, students develop critical technical skills, addressing OBE requirements for technical competency in their field. The exposure to real-world projects within various industries further strengthens students' communication and teamwork skills, as they collaborate with industry professionals and engage in multidisciplinary settings. This aligns with OBE goals of preparing students for professional collaboration in complex environments. Overall, the internship program equips students with a well-rounded skill set that aligns with both academic and industry expectations, ensuring they are competent, ethical, and adaptable as they transition from the classroom to their professional careers.

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DECLARATION OF COMPETING INTEREST

None

REFERENCES

Abdelaty, A. and Shrestha, K. 2019. Current practices of experiential learning in construction and technology programs. *Proceedings of International Structural Engineering and Construction* 6(1). https://doi.org/10.14455/isec.res.2019.54

Abdul, S. S. 2020. Industrial training programme: what matters most? *ASEAN Entrepreneurship Journal* 6(2): 22-28.

Alawamleh, M., & Mahadin, B. K. 2022. Will university internship secure you a job? Interplaying factors from an emerging market perspective. *Education & Training* 64(4): 491–515. https://doi.org/10.1108/ET-03-2021-0093

Anderson, K., Prem, K., Wirsbinski, S., & Courter, S. 2011. Comparing the learning experiences of male and female engineering students in internship and cooperative educational opportunities. https://doi.org/10.18260/1-2--17629

Arthur, P. and Koomson, S. 2022. Regulations governing student internship programme in ghana: a sequential explanatory multi-stakeholder approach. *Journal of Psychological Perspective* 4(2): 41-52. https://doi.org/10.47679/jopp.421972022

Azmi, A.N., Kamin, Y.B., Noordin, M.K., & Nasira, A.N. 2019. Effects of industrial training programmes on competencies of engineering graduates: A preliminary study. *Jurnal Kemanusiaan* 17(1-S): 5-9.

Baert, S., Neyt, B., Siedler, T., Tobback, I., & Verhaest, D. 2021. Student internships and employment opportunities after graduation: A field experiment. *Economics of Education Review* 83: 102141. https://doi.org/10.1016/j.econedurev.2021.102141

Caspersen, J. and Smeby, J. 2020. Placement training and learning outcomes in social work education. *Studies in Higher Education* 46(12): 2650-2663. https://doi.org/10.1080/03075079.2020.1750583

Duncan, D.W., Birdsong, V., Fuhrman, N.E., & Borron, A. 2017. The impacts of a national internship program on interns' perceived leadership, critical thinking, and communication skills. *The Journal of Leadership Education* 16: 23-39.

Fisher, K. 2023. Factors influencing nursing and allied health recent graduates' rural versus urban preferred principal place of practice: A cross-sectional data linkage study. *Australian Journal of Rural Health* 32(1): 117-128. https://doi.org/10.1111/ajr.13069

Gebeyehu, S. and Berhan, E. 2018. Impact of internship program on engineering and technology education in ethiopia: employers' perspective. *Journal of Education and Training* 5(2): 124. https://doi.org/10.5296/jet.v5i2.12945

Gordon, S., Adler, H., & Scott-Halsell, S. 2014. Career fairs: are they valuable events? hospitality and tourism recruiter perceptions of attributes towards participation and activities. *International Journal of Hospitality and Event Management* 1(1): 81. https://doi.org/10.1504/ijhem.2014.062858

Guler, H. & Mert, N. 2012. Evaluation of internship programs for educational improvements: A case study for civil engineering, *International Journal of Engineering Education* 28: 579-587.

Jain, S., Vichore, S., & Badra, S. 2023. Construct validation and exploration of student satisfaction from internships: Evidences from India. *Asia-Pacific Journal of Management Research and Innovation* 2319510X2311672. https://doi.org/10.1177/2319510x231167205

Jusoh, H. & Hadibarata, T. 2024. Bridging theory and practice: The role of site visits in environmental engineering learning. *Acta Pedagogia Asiana* 3: 13-22.

Kementerian Pengajian Tinggi. 2010. Dasar Latihan Industri: Institusi Pengajian Tinggi. http://www.agri.upm.edu.my/upload/dokumen/20181001145922DASAR_LATIHAN_INDUSTRI.pdf (Accessed on 31th October 2024)

Mohammad Yusoff, W.F., Ja'afar, N.H., & Mohammad, N. 2022. Preliminary investigation on architecture students' perceptions of developing hard and soft skills via project-based learning. *Jurnal Kejuruteraan* 34(4): 629-637. https://doi.org/10.17576/jkukm-2022-34(4)-11

Nogueira, T., Magano, J., Fontão, E., Sousa, M., & Leite, Â. 2021. Engineering students' industrial internship experience perception and satisfaction: work experience scale validation. *Education Sciences* 11(11): 671. https://doi.org/10.3390/educsci11110671

Ozek H.Z. 2018. Impact of internship in engineering education. *The Eurasia Proceedings of Educational & Social Sciences* 9: 276-283.

Rahate, V., Metre, S., Ambad, R. & Bhirange, S. 2020. Impact of Outcome Based Education (OBE) on teaching effectiveness of faculty members of professional program. Indian *Journal of Forensic Medicine & Toxicology* 14(4): 6997-7004. https://doi.org/10.37506/ijfmt.v14i4.12731

Saha, G. C., Akber, S. M., & Roy, A. (2023). Impact of Outcome-Based Education (OBE) on learners' performance in business courses. *International Journal of Professional Business Review* 8(8): e02394. https://doi.org/10.26668/businessreview/2023.v8i8.2394

Singh, M. and Rathi, R. 2019. A structured review of lean six sigma in various industrial sectors. *International Journal of Lean Six Sigma* 10(2): 622-664. https://doi.org/10.1108/ijlss-03-2018-0018

Tennant, S., Murray, M., Gilmour, B., & Brown, L. 2018. Industrial work placement in higher education. *Industry and Higher Education* 32(2): 108-118. https://doi.org/10.1177/0950422218756384

Thomson, G. 2020. Which aspects of engineering degrees do graduates most value in their working lives? *Információs Társadalom* 20(2): 132. https://doi.org/10.22503/inftars.xx.2020.2.9

Zainal, M.H.H., Md Nor, N., Mat Ali, M.F., Mat Saliah, S.N., Ismail, S.I.H. & Zadawa, A.N. 2023. The need to educate foreign workers based on the performance factor in a construction project, especially in a highly populated area in Johor, Malaysia. *Jurnal Kejuruteraan* 35(6): 1443-1453.

Zhang, X., Liu, R., Yan, W., Wang, Y., Jiang, Z., & Feng, Z. 2022. Effect analysis of online and offline cognitive internships based on the background of engineering education accreditation. *Sustainability* 14(5): 2706. https://doi.org/10.3390/su14052706