Web-Based Internship Recruitment System with Integration of Instant Notification Service for University Students

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ARTICLE INFO	ABSTRACT
	The critical role of internships in IT education is emphasized by rapid technological advancements, yet challenges such as limited platform availability and inefficient job posting processes persist. At UiTM Perlis, students face difficulties with manual document organization and finding internships, while organizations depend on coordinators for placements. This project introduces a web-based recruitment system integrating the Onyx Berry WhatsApp API for job notifications to address these issues. The system, which was created following the simplified System Development Life Cycle (SDLC) model, received a 90.8% satisfaction rate during user acceptance testing, which involved 30 students and 5 company staff. It significantly benefits students by streamlining internship applications, organizations by improving job posting efficiency, and coordinators by reducing administrative workload. Future improvements could include geo-spatial elements with Google Maps, direct communication features, comprehensive recruitment scheduling, and community-building, alongside user feedback mechanisms for continuous enhancement.

1. INTRODUCTION

With the rapid advancement of technology, there is an increased demand for people to not only use technology but also gain practical experience in the Information Technology (IT) field. Internships have emerged as an important component of education, providing hands-on experience in navigating the rapidly changing IT landscape. This trend is especially prevalent in Malaysia, where internet usage has skyrocketed. Currently, 68.7% of Malaysians use the internet, with an average of 2.8 hours per day (Rahman et al., 2020). This increase in internet activity highlights the urgent need for dependable solutions that can improve various aspects of daily life, such as facilitating job searches and securing internship opportunities.

However, finding an internship placement is a difficult task. It often required significant work and persistence on the part of applicants. Securing an internship placement can be a difficult procedure, as it requires extensive preparation on the part of a student to secure a placement spot from a company (Fei et

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al., 2020). The management of internships, starting from registration to student reporting, is often perceived as ineffective and inefficient because students must meet with the internship coordinator, fill out registration forms, and collect the required documents (Nugraha et al., 2023). It is essential to provide a platform that connects students with internship opportunities within companies.

Web-based systems are becoming increasingly popular due to their accessibility, making them the ideal choice for modern applications and only need internet to use the website. Web-based applications have become the majority of IT due to the rapid development of information technology (IT) and Internet applications, i.e., there are more and more tools accessible to assist us in creating web-based application (Peng & Chang, 2021). Internship Recruitment Web-Based System is a system that can assist students in finding placement opportunities and find a suitable internship.

Additionally, notifications services for web-based apps have grown in popularity in recent years. These notifications help to notify users of crucial information or updates. There are various notification services available, including pop-up notification, SMS, email, and instant messaging that can help the recruitment process. This can be accomplished in a variety of ways, including benefit communication during the recruitment process (Jolly et al., 2019). This would provide accessibility for students to ascertain the status of their applications, whether they have been offered or rejected.

This study proposes and creates a web-based application to solve issues and improve the experience for both students looking for an internship and companies looking to fill an internship position.

2.   LITERATURE REVIEW

This section discuses literatures that related to this study. This literature review examines several aspects related to the study, focusing on the impact of internship programs, web-based systems, and notification service integration.

1.1   The Impact of Internship Programs on Career Development

Internship programmes have a significant impact on career development, providing several advantages to individuals looking to begin their professional journey. These programmes offer students and recent graduates the opportunity to obtain practical experience, develop necessary skills and create crucial connects in their chose sector. According to research, students may seek internships on purpose to ease their worries about their future jobs (Ebner et al., 2021). Internships give individuals with a unique opportunity to apply their knowledge in a real-world situation, working alongside professionals in their industry.

This hands-on experience improves technical skills and creates a more in-depth grasp of industrial practises. Internships are also important for skill development since they allow participants to gain new technical and transferable abilities that employers value, such as such as communication, teamwork, problem-solving, adaptability, and time management. Internships enhance these abilities through their practical nature, making interns more employable and prepared for future professional prospects. Participants believe that internships provide opportunity to study, practise, and apply skills while acquiring career and life experience (Thompson et al., 2021).

In addition to this, internship courses will function as a place for building networking between organisations. Work-related learning and practical training in the form of internship programmes are essential for business students' personal and professional development, as well as for establishing strong links with top corporate organisations (Anjum, 2020).

1.2   Internship requirements

Internship requirements for students and industries may differ according to organisations and industry. The usual demands for students include enrolment in a relevant academic programme, with some internships requiring a minimum CGPA. Employers often use CGPA to favour higher-achieving candidates during recruitment due to the surplus of job applicants (Getie Ayaneh et al., 2020). Student must have the necessary skills and knowledge for the internship role and be available to commit to the internship for a set period. They must typically submit application materials such as a resume, cover letter, and, in some cases, additional documents such as a portfolio or letters of recommendation. Aside from that, some organisations demand students to have dependable transportation to and from internship places, which some students lack access for this.

On the other hand, industries need to offer an accurate job description that outlines the duties, responsibilities, and necessary skills for the internship position. A manager or supervisor must be assigned to watch over and help the intern during their internship. This role is key in guiding interns, offering mentorship, and supporting their professional growth (Amissah et al., 2023). It is imperative that students thoroughly examine the prerequisites for internships and that employers make their expectations known to prospective interns.

1.3   Web-Based Systems

Web-based systems are ideal for developing applications like an Internship Recruitment System due to their flexibility, ease of maintenance, and wide accessibility. A web-based application is software that users can access and interact with via a web browser over the internet. These applications run on web servers and do not require installation on the user's device, making them versatile and user-friendly (Sulton & Setiawan, 2014, as cited in Trikusuma et al., 2022). They are compatible with various browsers, such as Chrome, Firefox, and Microsoft Edge, allowing users to access software systems from any device with an internet connection.

Web-based applications commonly use a client-server architecture, which divides tasks between the server and the client. The server manages data processing, storage, and resource delivery, while the client, typically a web browser, handles user interactions and forwards requests to the server (Vesić & Kojić, 2020). This architecture is becoming more prevalent with the rise of front-end frameworks and client-side scripting languages, which enhance the functionality and responsiveness of web applications (Li, 2024). Web development often involves using multiple programming languages and technologies, including HTML, CSS, JavaScript, and PHP, which are widely adopted by developers to create dynamic and interactive applications (Sotnik et al., 2023).

Web-based applications offer several advantages. First, they do not require installation on user devices, making them accessible through a web browser without taking up storage space. This results in time and storage efficiency and makes them easier to use since users do not need to install or maintain software locally. Web-based applications can handle multiple requests simultaneously, providing faster processing and a better user experience (Djoumbou-Feunang et al., 2019). Second, updates and maintenance are more manageable since they are performed on the server side. Users automatically receive the latest updates without needing to download anything, ensuring that everyone has access to the most current features and bug fixes (Routray et al., 2022).

There are two main types of web-based applications: static and dynamic. Static web applications display fixed content that does not change dynamically. These applications are suitable for websites that do not require frequent updates or user interactions, such as informational pages or portfolios. They are easier to develop and maintain due to their simplicity, have faster loading times, and are generally more secure because they lack server-side processing. However, they do not offer interactive or personalized experiences. In contrast, dynamic web applications can change their content, appearance, and functionality based on user input or system events. These applications use various programming languages and tools,

such as PHP, JavaScript, and MySQL, to create interactive and responsive features (Roy et al., 2022). While they provide a more engaging user experience, dynamic web applications can have slower loading times due to server-side processing, be more expensive to develop and maintain, and face higher security risks.

Overall, web-based systems, whether static or dynamic, offer significant benefits, such as accessibility, ease of maintenance, and the ability to provide interactive user experiences. These characteristics make them a valuable choice for applications that require broad accessibility and frequent updates, like an Internship Recruitment System.

1.4   Instant Notification Service

Notification services are an essential component of current communication systems, allowing users to get important updates, alerts, and messages in real time. Notifications are frequently used in software applications, websites, and mobile devices to keep people up to date. Notification systems have become increasingly important in driving and maintaining user engagement on online platforms (Yuan et al., 2022). The usage of notification technologies, such as Short Message Service (SMS) and Instant Messaging (IM) apps like WhatsApp, Telegram, and Email, has been extensively researched in a variety of sectors. Furthermore, the use of instant messaging applications for professional purposes has been on the rise, providing extensive support for interpersonal and organizational communication (Jiang et al., 2021). Table 1 tabulates the applicability of notification methods focusing on IM notification technologies. Based on that this study utilized the best service for the notification purposes.

Table 1. Comparison of Notification methods

Features	Telegram	WhatsApp	SMS	Email
Message Delivery	Instant	Instant	Instant	Instant
Security	End-to-end encryption (default)	End-to-end encryption (default)	No encryption	TLS/SSL encryption
Cost	Free (requires internet)	Free (requires internet)	Charges per message	Usually, free
Integration	API available	API available	API for bulk SMS services	SMTP/IMAP for integration
Delivery Reports	Read and delivered status	Read and delivered status	Delivery reports (optional)	Read receipts (optional)
Message Delivery	Instant	Instant	Instant	Instant

WhatsApp stands out as the best notification method due to its comprehensive feature set and widespread usage. It offers instant message delivery, ensuring timely communication, and provides robust security through default end-to- end encryption, safeguarding user data. The service is free, requiring only internet access, making it cost-effective for both personal and business use. WhatsApp's API availability allows for seamless integration with various systems, enhancing automation and efficiency. Additionally, the platform supports read and delivered status reports, enabling users to track the delivery and engagement of their messages. These combined features make WhatsApp a superior choice for reliable, secure, and cost-effective notifications.

1.5   Integration of Web-Based System with Notification Service

Integrating a web-based system with a notification service enables users to receive real-time updates and notifications, ensuring timely and effective communication. By delivering important information directly to users' devices, this integration improves the overall user experience and provides convenience. This feature has the potential to significantly improve the efficiency and effectiveness of B2B e-commerce systems. Companies can ensure that their clients and suppliers receive timely updates and information.

In the healthcare sector, for example, smartwatch-based notification systems have been shown to improve staff performance, reduce workload, and increase patient satisfaction, resulting in better quality of care and patient safety (Budiman et al., 2022). This not only improves company processes but also promotes better communication, resulting in higher customer satisfaction and stronger business relationships. This feature also can improve the system performance. Integration of a web-based notification system can be a game changer for students looking for internships. This will improve their experience and provide them with timely information, removing the need for manual follow-ups. Students will never miss important updates or opportunities thanks to the notification system, making the internship application process more efficient and convenient for them. The use of notification systems has been shown to reduce response time, improve response accuracy, and facilitate emergency communication, all of which can be critical in providing students with timely information (Nasir et al., 2022).

3.   METHODOLOGY

This study uses a simplified Waterfall model to develop the Internship Recruitment System. The methodology consists of three main phases: Requirement Analysis, Design and Development, and Evaluation. Each phase involves a series of specific tasks essential to the development process.

(i)   **Requirement Analysis:** This phase focuses on gathering detailed information and specifying the project's requirements. It involves understanding the needs of both students and companies to ensure the system meets all functional requirements.

(ii)   **Design & Development:** In this phase, the gathered requirements are transformed into a functional system. Wireframe designs are created and then developed into a working application using appropriate web technologies such as PHP, MySQL, HTML, CSS, and JavaScript. This phase also includes integrating the system with necessary APIs, such as the WhatsApp API, to enhance communication between companies and students.

(iii) **Evaluation:** This phase includes testing the system's functionality and gathering user feedback through User Acceptance Testing (UAT). In functionality testing, three participants were involved to identify and fix any bugs or issues. Meanwhile, the user acceptance questionnaires is based on Technology Acceptance Model criteria, 35 participants were involved, including 5 company representatives and 30 students in UiTM. These participants provided feedback on the usability and effectiveness of the system. The results from both tests were analysed using descriptive statistics to assess the system from various perspectives.

Approval for conducting this study, including surveys and evaluations with targeted participants, was obtained from the UiTM Research Ethics Committee (REC/94/2024). Fig. 1 illustrates the research methodology used in this study.
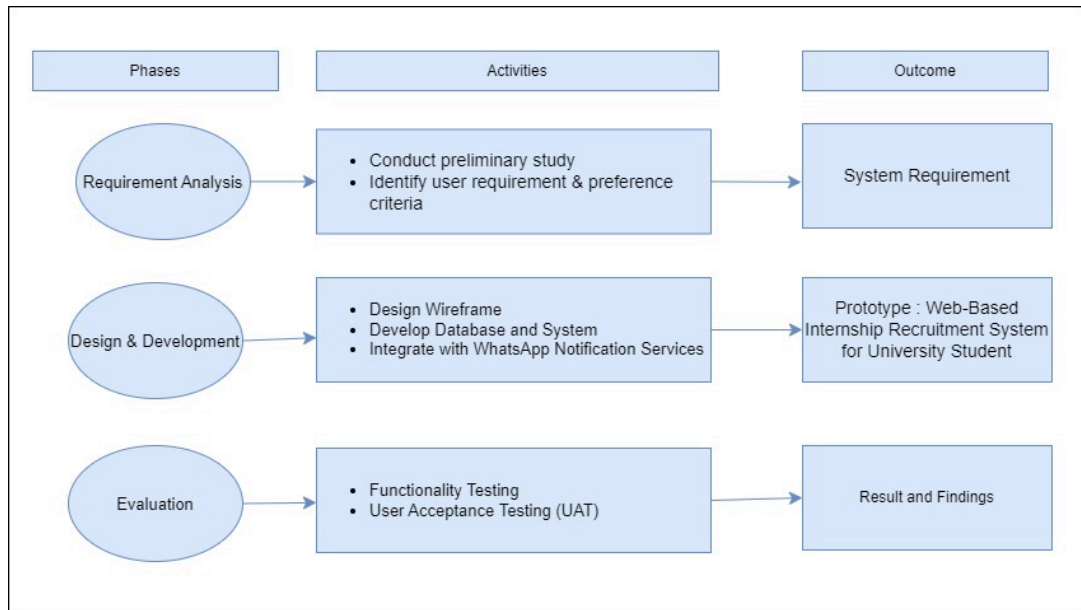
Fig. 1. Research activities

3.1 Prototype of Proposed System - A Web-Based Internship Recruitment System for University Students

The Web-Based Internship Recruitment System is a comprehensive platform designed to bridge the gap between university students seeking internships and companies looking to recruit talented individuals. The website allows companies to easily create profiles, post internship opportunities (see Fig. 2. Job Listings) and manage applications (refer to Fig. 3. Company Review Application). For students, the platform provides a user-friendly interface to browse available internships (see Fig. 4. Details of Positions), view company profiles, and submit applications directly through the system.

The system incorporates features such as search filters to assist students in finding internships that align with their interests and qualifications, as well as a dashboard for companies to monitor applicant status and communicate with potential candidates (see Fig. 5. View Application). Furthermore, integration with Onyxberry's WhatsApp API ensures that students receive timely notifications regarding application statuses and deadlines (see Fig. 6. Onyxberry WhatsApp Interface and Fig. 7. Example of Notification), which fosters efficient communication and engagement between both parties. The application submission process is streamlined by a straightforward confirmation page (see Fig. 8. Confirmation Page). Overall, the system aims to enhance the internship recruitment process by making it more streamlined, accessible, and efficient for all users involved.
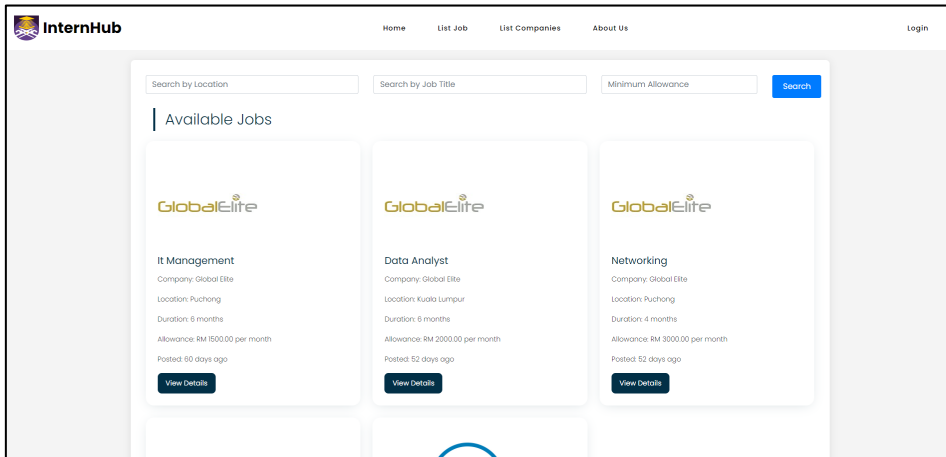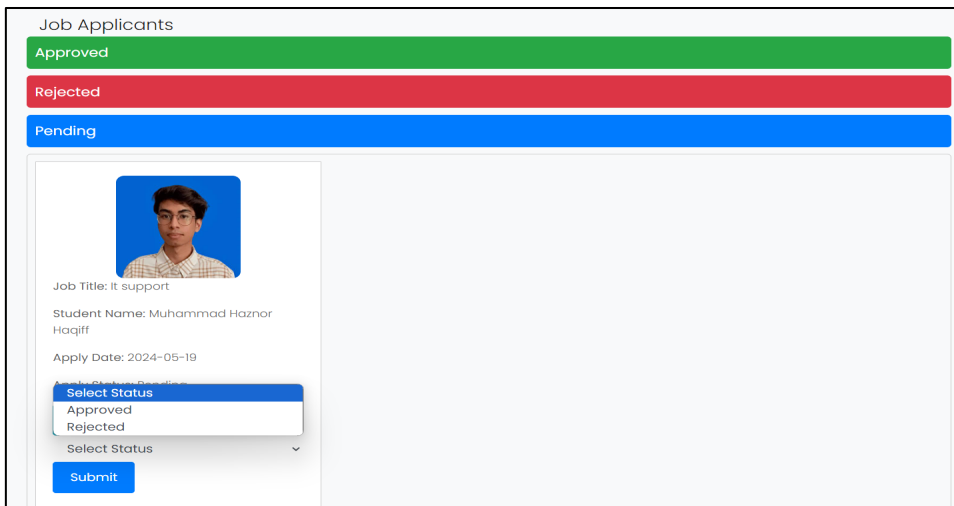
Fig. 2. Job Listings

Fig. 3. Company Review Application

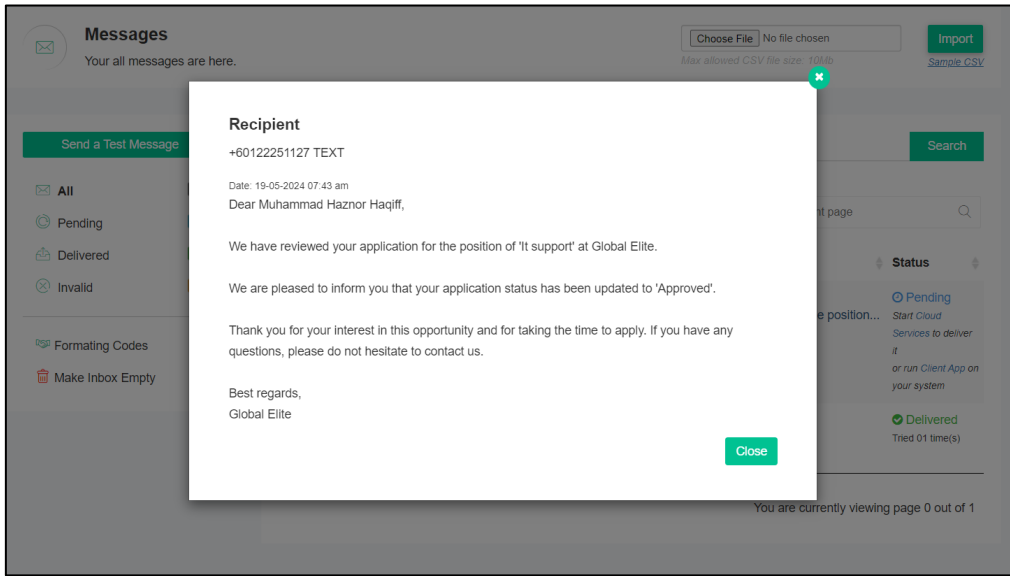Fig. 4. Details of Positions

Fig. 5. View Application

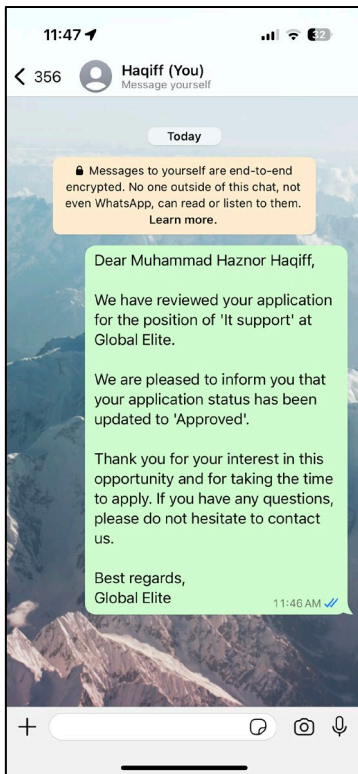Fig. 6. Onyx berry WhatsApp Interface

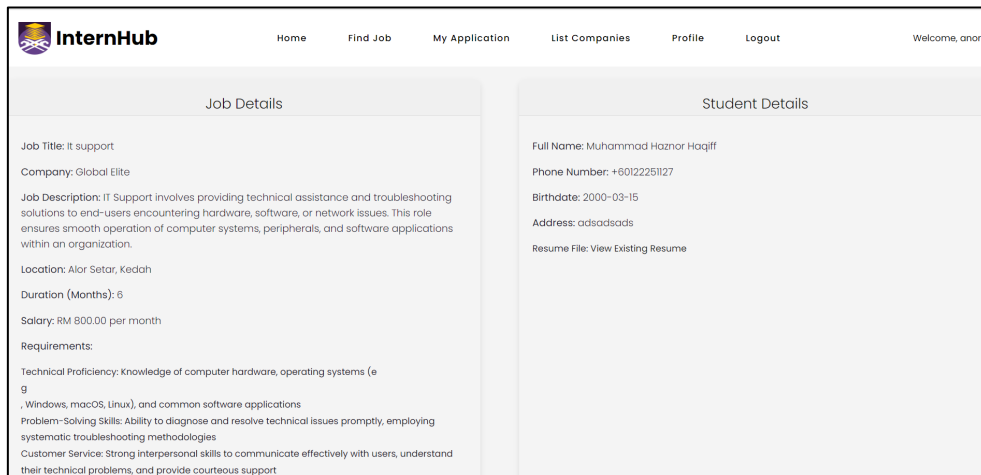Fig. 7. Example of notification message

Fig. 8. Confirmation Page

4.   RESULTS AND DISCUSSIONS

The findings and discussions regarding user experiences with the Web-Based Internship Recruitment System for University Students are presented in this section, highlighting key insights gained from the evaluation process. Following the development phase, User Acceptance Testing (UAT) and Functionality Testing were conducted to evaluate the system's functionality and user acceptance based on the Technology Acceptance Model (TAM). UAT must ensure that the system is capable of handling the way users expect it to work (Lehto, 2024). It involved feedback from students and company representatives using Google Forms. The system allowed different user roles—admin, company, and student—to manage various tasks, such as account creation, job posting, and application processing. Functionality testing ensured all features operated correctly by comparing expected and actual results, identifying any discrepancies as potential software errors. The Technology Acceptance Model (TAM), widely recognized for its applicability in assessing users' willingness to adopt information and communication technology (ICT), provided a valuable framework for evaluating user acceptance in this system (Malatji et al., 2020).

4.1   Testing Procedure and Participants

Functionality testing involved three participants—students, coordinators, and company representatives, who evaluated the Web-Based Internship Recruitment System using pre-defined test cases for their respective roles. Each participant was provided with test cases (Fig. 9) outlining all features, including sample input (both correct and incorrect) and expected output, at the start of the testing session. Participants were chosen for their expertise in Information System Development to ensure thorough and accurate testing of the system's functionalities.

Step	Test Steps	Test Data	Expected Result	Actual Result	(Pass/Fail)
1	Input correct username and password	admin/123	Successful		
2	Input incorrect username and password	admin/12345	Unsuccessful		
3	Add New Admin	admin2/123	Successful		
4	Approve/ Reject Company	Sime Darby	Successful		
5	Blacklist/Unblack list company	Dell	Successful		
6		Dell	Successful		
7	View Student Profile	Muhammad hamor haqiff Bin hamam	Successful		
8	Delete Student	Hamor Haqiff from CS240	Successful		
9	Check Internship Status	CS240: Muhammad Hamor Haqiff	Successful		

Step	Test Step	Test Data	Expected Result	Actual Result	(Pass/Fail)
1	Company Registration	Dosh/dosh123	Successful register and input company information		
2	Input correct username and password	Dosh/dosh123	Successful		
3	Input incorrect username and password	Dosh2/dosh000	Unsuccessful		
4	Add internship job	Add It Support position	Successful		
5	Update Job	Allowance RM1000 to RM1500	Successful and the system displays the new update details		

Fig. 9. Sample of test cases in functionality testing

User acceptance testing was conducted to evaluate the Web-Based Internship Recruitment System by assessing its features from the perspectives of different users. Participants included instructors, students, and company representatives, each interacting with the system according to their specific roles. The testing process involved distributing 2 sets of questionnaires (for different role of participants) that covered all essential features and functions of the system. Participants were asked to perform various tasks, such as logging in, managing profiles, and processing applications, while providing feedback on their experiences. Data collected through surveys to gauge overall user satisfaction and system performance. For the user acceptance testing, each category was evaluated based on the criteria in Table 2 using 5-point Likert Scales (from 1-Strongly Disagree to 5-Strongly Agree).

Table 2. Criteria of User Acceptance Test

Criteria	No of Item
Perceived Ease of Use (PEU)	5
Perceived Usefulness (PU	4
Attitude (ATT)	3
Intention to Use (BI)	4

4.2   Result and Analysis

In the internship recruitment system, Table 2 illustrates the number of case steps and the success rates for three roles: Admin, Company Representative, and Student. The admin role completed 9 steps with a success rate of 88.9%, while both the Company Representative (12 steps) and Student (12 steps) roles achieved a 100% success rate. The slightly lower success rate for the admin role is due to issues with devices and internet connections during the testing phase, which impacted overall performance and task completion.

Table 3. Functionality Test Result

Role	Number of Test Case Step	Successful Rate
Admin	9	88.9%
Company Representative	12	100%
Student	12	100%

The user acceptance testing results show that both students and companies view the Web-Based Internship Recruitment System favorably. Students rated the system's ease of use at an average of 4.44, indicating that it is user-friendly, and its usefulness at 4.50, reflecting its effectiveness in aiding their

internship search. Their overall attitude towards the system was positive, with a mean score of 4.51, and they demonstrated a strong intention to continue using the system (mean score = 4.47). However, company representatives rated the system even higher, with an average ease of use score of 4.60 and perceived usefulness at 4.56, showing that the system effectively supports their recruitment needs. Their attitude towards the system averaged 4.67, and their intention to use it was rated at 4.56. Below is the comparison of each criterion of TAM evaluation as illustrated in Fig. 10.

(i)   **Perceived Ease of Use:** Students rated the system's ease of use at 4.44, while company representatives rated it higher at 4.60. This suggests that while both groups find the system user-friendly, companies find it slightly more intuitive and easier to navigate.

(ii) **Perceived Usefulness:** The perceived usefulness of the system was rated at 4.50 by students and 4.56 by companies. This indicates that both groups find the system effective in fulfilling their respective needs, with companies finding it marginally more beneficial for their recruitment processes.

(iii) **Attitude**: Students' overall attitude towards the system averaged 4.51, whereas companies rated it at 4.67. This significant difference highlights that companies have a more positive overall perception of the system, possibly due to their alignment with their recruitment goals.

(iv) **Intention to Use**: Both students and companies showed a strong intention to continue using the system, with scores of 4.47 and 4.56, respectively. This demonstrates a high level of satisfaction and a likelihood of continued engagement from both groups.
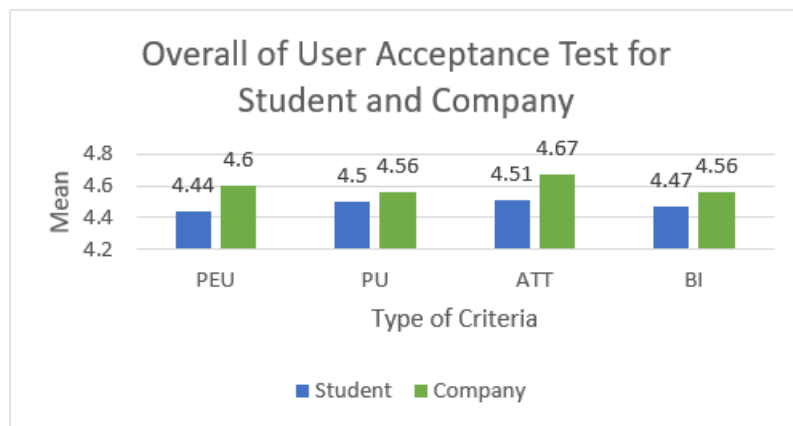

Fig. 10. Overall user acceptance test result by criteria

The average mean score for students is 4.49, while the average mean score for company representatives is 4.60. This indicates that company representatives rated the Web-Based Internship Recruitment System more favorably compared to students. The higher scores from companies suggest that the system is particularly effective in meeting their recruitment needs, while students also view the system positively but with slightly lower enthusiasm. Overall, both groups have a favorable attitude towards the system, with companies showing a stronger intention to continue using it. The combined overall satisfaction rate from both groups is 90.8%, indicating that the system is both effective and well received, suggesting strong potential for continued use and success.

5.   CONCLUSION AND DISCUSSION

The Web-Based Internship Recruitment System for University Students project successfully met its objectives by streamlining the internship application process and enhancing communication between students and companies through features like easy job posting and WhatsApp notifications. Overall, the system is more efficient, cost-effective, and scalable compared to traditional methods, making it a valuable tool for modern recruitment needs. Based on the result, this study could clearly infer that companies value the Web-Based Internship Recruitment System for its user-friendly interface, effective matching algorithms, comprehensive candidate profiles, communication tools, analytics and reporting features, and customization options. These features collectively enhance the recruitment process by making it more efficient and tailored to their needs, leading to higher overall satisfaction and a strong intention to continue using the system.

However, several limitations were identified, including the lack of direct chat functionality, absence of detailed recruitment timelines, and the inability to detect nearby internship locations. To overcome these challenges, future research could focus on integrating geo-spatial features, enabling direct communication tools, providing detailed recruitment schedules, and fostering community engagement through forums and networking events. Additionally, implementing guidance features like FAQs or tutorials and incorporating a user feedback mechanism could further enhance the system's usability and effectiveness

6.   ACKNOWLEDGEMENTS/FUNDING

7.   CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

8.   AUTHORS' CONTRIBUTIONS

Muhammad Haznor Haqiff: System design, development and conduct testing; **Siti Zulaiha Ahmad**: Analysis of testing, supervision, paper review and editing; **Jasmine Lim Seow Tiap**: Industrial expertise advisor.

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