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Developing a micro tasking online crowdsourcing platform for handworkers

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ABSTRACT

Online crowdsourcing has emerged as economic solutions for digitally literate modern society. The use of non-standard employees is what defines the gig economy, in which the hired crowds execute short-term, on-demand micro job assignments for a range of people or companies. Despite the existence of several local crowdsourcing app in the market, there is lack of study on the interaction model of a micro tasking online crowdsourcing platform for handworkers such as plumbing and piping, furniture and household items repairs, installation, electrical repairs, house modelling, carpeting and more. Hence, a prototype of virtual middleman system for handworker crowdsourcing is developed. The technical requirements and design principles of a web-based handworker crowdsourcing system are identified. Evaluation results of functionality, usability, interface and compatibility testing are presented. Essentially, this study contributes to the body of literature by granting a transferable technical requirements and economical potential of virtual middleman system for handworker crowdsourcing. However, the system was tested in a controlled environment with a limited user base, which may not fully represent real-world usage scenarios. Hence, subsequent study should incorporate performance indicators such as task completion rate, latency, or long-term user engagement.

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1. INTRODUCTION

In recent years, online crowdsourcing has arisen as one of digitized economic solutions in the age of Industrial Revolution 4.0. This paradigm demands on humanized intelligent systems interaction scheme for digitally literate society. Fundamentally, online crowdsourcing evolved from offline crowdsourcing, which involves recruiting donors, employees, and volunteers through the internet [1]. Gig labour is regarded as an affordable but effective service [2]. Plus, the need for flexible work schedules and internet accessibility continue to rise [3]. Due to these conveniences, there is a wide interest development of interactive online platforms for crowdsourcing campaigns. Therefore, understanding how to take advantage of the enormous opportunities presented by using online crowdsourcing platforms to source outside expertise is crucial [4].

In this paper, we propose an integrated online crowdsourcing platform for handworkers. Handworkers in this study include professional handyman service providers such as plumbing and piping, furniture and household items repairs, installation, electrical repairs, house modelling, carpeting and more. Current scenario in Malaysia describes the difficulty to find skilled handymen for maintenance work. Aside

from that, an online platform for handymen provides opportunity for newcomers to venture on jobs and tasks usually dominated by experienced handworkers. As information technology meets nearly all of the needs of people [5], this paper elaborates the development activity and evaluation of the proposed handymen micro tasking system.

To date, limited study has been conducted on web-based virtual middleman system for handworker crowdsourcing. Furthermore, existing online marketplace demonstrates that only few middleware apps are available for connecting handwork service providers (plumbing, electrical repairs, and home maintenance work) with their prospects. Plus, abundance of these handyman apps is dedicated to DIY tips and static information sharing. So far, virtual middleman applications have shown success in diverse fields such as transportation (Uber and Grab), travel (Trivago and Air Bnb), education (Skooli), car battery delivery (Bateriku), food delivery (FoodPanda), and many others.

Hence, this study seeks to answer the following questions:

- What are the technical requirements and design principles of a web-based handworker crowdsourcing system?
- How to develop a prototype of virtual middleman system for handworker crowdsourcing based on the identified requirements and principles?
- What the usability performance of completed prototype?

2. LITERATURE REVIEW

Crowdsourcing is typically classified into four distinct categories: microtasks, macrotasks, crowdfunding, and contests [6]. For workers to perform their jobs, microtasks divide a major project into small, clearly defined tasks [7]. Users pay service providers to help them solve specific problems through a crowdsourcing platform [8]. Instead of being paid on the basis of an hourly rate or salary, these gig workers are only compensated for timely fulfilment of certain work assignments [9]. They have more freedom to develop their skill sets based on their interests and market demand, and work on projects that suit their skill sets [10]. In contrast to conventional companies, gig platforms link workers to clients as “independent contractors” rather than hiring them as employees [11]. In contrast to crowd funding, which supports initiatives through gifts, incentives, loans, and equity [12], crowdsourcing outsource paid works to the crowd. In general, crowdsourcing platforms along with their examples can be classified as follows:

- Micro tasking-Amazon Mechanical Turk, Fiverr, Grab, Upwork and Food Panda, Service Hero, and Gimmart.
- Crowd funding–Kickstarter, Indiegogo, Patreon, ArtistShare, and GoFundMe.
- Crowd testing–Teslio, Digivante, Cobalt, User Testing, and TestBirds.
- Creative-freelancers, 99Designs, PeoplePerHour, and Outsourcely.
- Collaborative knowledge–Quora, PatientsLike Me, SodaHead, and Digg.

With the rapid growth of crowdsourcing platforms, scholarly efforts have increasingly focused on investigating and analysing this emerging mode of labour provision, while simultaneously addressing the associated challenges. The microservices are expected to function collaboratively as a unified application, providing an extended range of services, making inter-service connectivity a critical requirement [13]. Platform owners create proprietary applications for users to download and sign up for [14], [15]. According to platform companies, their employees are independent contractors who can select the workplace of their choice and who are responsible for providing their own resources [16]. Since gig workers have control over their commission rates and the surplus they generate, they are able to set conditions that lead to higher earnings and improved job security [17]. However, to yet, no comprehensive effort has been done to determine the elements that influence the calibre of work on these platforms [18]. Furthermore, new forms and structures of work are prompting scholars to reconsider the organisation of work, particularly tasks facilitated through digital platforms [19].

Platform-based work can take a “geographically-sticky” form (Type A), as exemplified by services such as Uber (transport), Deliveroo (delivery), or TaskRabbit (doing handyman type tasks) with location specific requirements. The subsequent two categories are digitally mediated and less dependent on physical location, yet they differ based on the level of skill required. Microtask platforms (Type B) consist of brief, crowdsourced tasks that generally demand comparable skill levels. This type of work is highly commoditised, with no direct interaction between clients and workers; examples include platforms such as Amazon Mechanical Turk and CrowdFlower. Freelance platforms (Type C) require more specialised skills and enable a more direct interaction between clients and workers; examples include Upwork and Freelancer [20].

3. PROPOSED SYSTEM

The subject of the research underlying this paper is handymen or people who are seeking for part-time job as handworkers will find the proposed system beneficial. Thus, the main purpose of this system is to make both potential client and handworkers find one another within a distinct platform. The system is developed with Sublime by using language HTML, CSS, PHP, JavaScript, and MySQL as a database. At the most basis, the app contains a booking system which is at the same time user can register both as a customer and also be a service provider (refer to Figure 1). As a customer, user can search for the service that available and then booked that service. As worker, user plays the role as service provider by creating and managing a service.

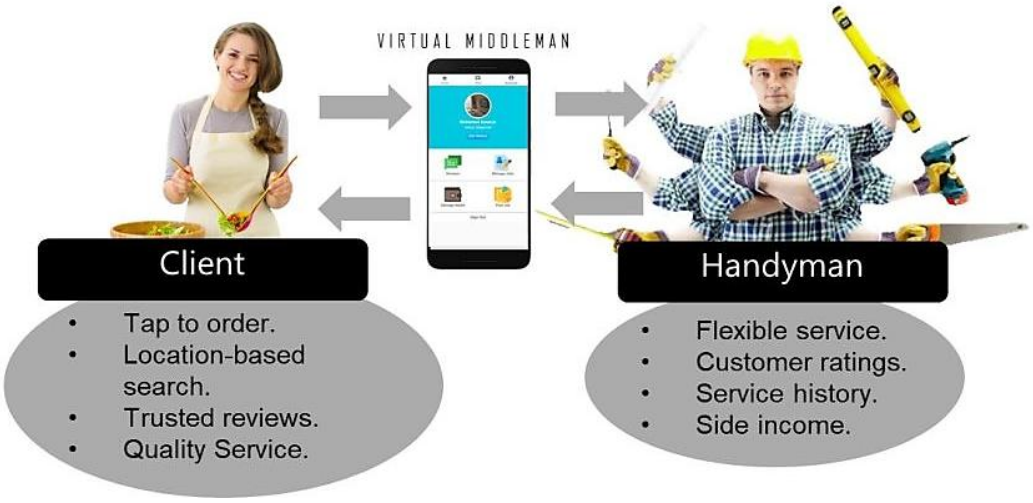

Figure 1. Proposed interaction model for handworkers micro tasking online crowdsourcing platform

This research expects to explore the primary process of creating an online crowdsourcing platform specifically for handworkers. This platform would facilitate micro tasks, which are simple assignments that can be completed in certain time frame. Handworkers would participate in the platform like data entry, validation, and content moderation, contributing to the platform's success and enabling businesses to outsource tasks efficiently. Importantly, results from the study should grant a transferable technical requirements and design principles of virtual middleman system for handworker crowdsourcing.

4. METHOD

Software development life cycle (SDLC) had been chosen to be method in developing the micro tasking online crowdsourcing platform for handworkers. The elements included is requirement gathering, design, implementation, testing and evolution. Requirements collected must be correct, complete, and concise to ensure the success of the developed software system [21]. Then, implementation phase is crucial where everything needs to be executed into the application to reach what the client needs. Combination of linear, webbed and hierarchical layouts are applied with structure of their own.

In the testing phase, the application is evaluated in terms of usability. This includes alpha testing and beta testing. Functionality testing also included in this stage to make sure the system is fully functional before it reaches the end user. Environment test, organization test, and schedule test are the three major phases in testing phase. Residential area is chosen as the environment test. Initially, in the analysis phase, there is a few analyses used which is technical, content, and need analysis.

4.1. Need analysis

This activity involves acquiring users' needs and issues regarding the current scenario. The target user for the proposed system are existing handworkers or personnel who are willing to do maintenance service as a part time job as. One scenario describes how people have to leave home and search for handyman to do a maintenance work, resulting users need to spend more time and cost just to hire a handworker for making repairs and troubleshooting. Aside from that, some handymen also do not have any platform to advertise their services since the broadcast from radio and printed media in a newspaper cost

higher where certain handyman have not had the acquired budget. To conclude, these addressed issues must be solved by the proposed system.

4.2. Technical analysis

The application system is constructed using PHP and CSS. Incorporating CSS allows styling the PHP-generated content. Sublime text and Xampp are used for internal development. Once internal functionality is tested, online web server is used for hosting the app.

4.3. Content analysis

A web-based application system is essentially delivering the content through multimedia content such as text, image, video, audio, and animation. The content of the webpage included about maintenance works, services, details about booking, and details about users. To identify the categories of handworkers job list, web research is conducted. Overall, we gathered the following jobs in Figure 2 to be included in the proposed system.

- Appraising of property
- Barbecue pit maintenance
- Cabinet refacing
- Carpentry
- Ceiling repair
- Ceramic tile repair
- Cleaning
- Concrete work
- Countertops
- Crown moulding
- Curtain hanging
- Decks
- Door installation
- Door repair
- Dryer repair
- Dryer vent cleaning
- Dryer vent installation
- Drywall installation
- Drywall repair
- Insulation installation (batts)
- Insulation installation (blown-in)
- Lamp repairs
- Landscaping
- Lawn care
- Lock set adjustment
- Maid service
- Molding installation
- Moving
- Paint removal
- Painting
- Patio stone installation
- Pest control
- Plumbing repairs
- Porches
- Remodeling basements
- Remodeling bathrooms
- Tiling
- Tile and grout cleaning
- Re-grouting
- Trash removal
- Wall building
- Waste and junk removal
- Water purification
- Water softening
- Window cleaning
- Welding
- Window installation
- Window repair
- Window screens
- Heating and air conditioning system tune-up
- Home inspections
- Home security systems
- Hot tubs and spas
- Fan installation
- Fence fixing
- Fireplace cleaning
- Flooring installation and repair
- Foundations
- Framing
- Garage door openers
- Garage doors
- General maintenance
- Gutter cleaning
- Gutter Repair
- Sprinkler repair
- Sprinkler system installation
- Stain removal
- Staining furniture
- Stone work
- Remodeling kitchens
- Roofing
- Safety modifications
- Sealing driveways
- Senior living modifications
- Septic system repair
- Shelf installation
- Shelving
- Skylight installation
- Solar panels
- Soundproofing
- Electrical repairs
- Energy updates
- Storage area construction
- Storage area repair
- Swapping a toilet

Figure 2. List of potential handymen jobs

5. IMPLEMENTATION

5.1. Module design

Modules functionality is discussed in Table 1. Each module is designed to perform a specific function or task, and these modules work together to achieve the overall functionality of the proposed system. The developed system utilizes a rule-based approach to perform matching based on predefined criteria and logical conditions. They are broken down from complex system into smaller, independent components.

5.2. Navigation design

Navigation design acts as model of the system itself. All functionality or behavior in the proposed system is visualized through the system architecture. Figure 3 (in Appendix) describes wayfinding design of the proposed system. Through user login, they can access four key modules -Inbox, Service, Status, and History, each offering specific functionalities such as managing messages, services, task statuses, and historical records. A conceptual model is created using an ERD to represent the key data entities and their relationships [22] which is depicted in Figure 4.

Table 1. Scope of functionality

Quantity	Description
Registration	Users must register to use the app.
Login system	For entering username and password.
Manage profile	Allows users to modify some of their user details.
Search services	Search the services based on searching criteria (type of service and location).
View services	View the service available that have been created by the other user.
Book services	Allows users to book the service, and some data required (request date, request time, and address).
Add services	Allows users to input their maintenance services into system to advertise their services by inserting some data required (type of service, location available service, basic price charge, and contact details).
Delete services	Allows users to delete their services.
View status	– As a customer: the message about requesting the services that already booked is accepted or not. – As a service provider: the message about customer had requested to him/her.
View inbox	View the message and sent message to the service provider.
View event services	View the services that they have been booked after the booking is accepted by the service provider.
Pricing	Allows users (as a service provider) to insert add on price (includes: equipment that have been used, materials).
View receipt	View the receipt after the servicer put the add on price and see the total payment they had paid.
View history	– Customer: details about type of service received, servicer provider id, total payment and date received service. – Service provider: details about type of service done, customer id, total payment received and date provide the service.
View profile	Allows users to view their profile details.

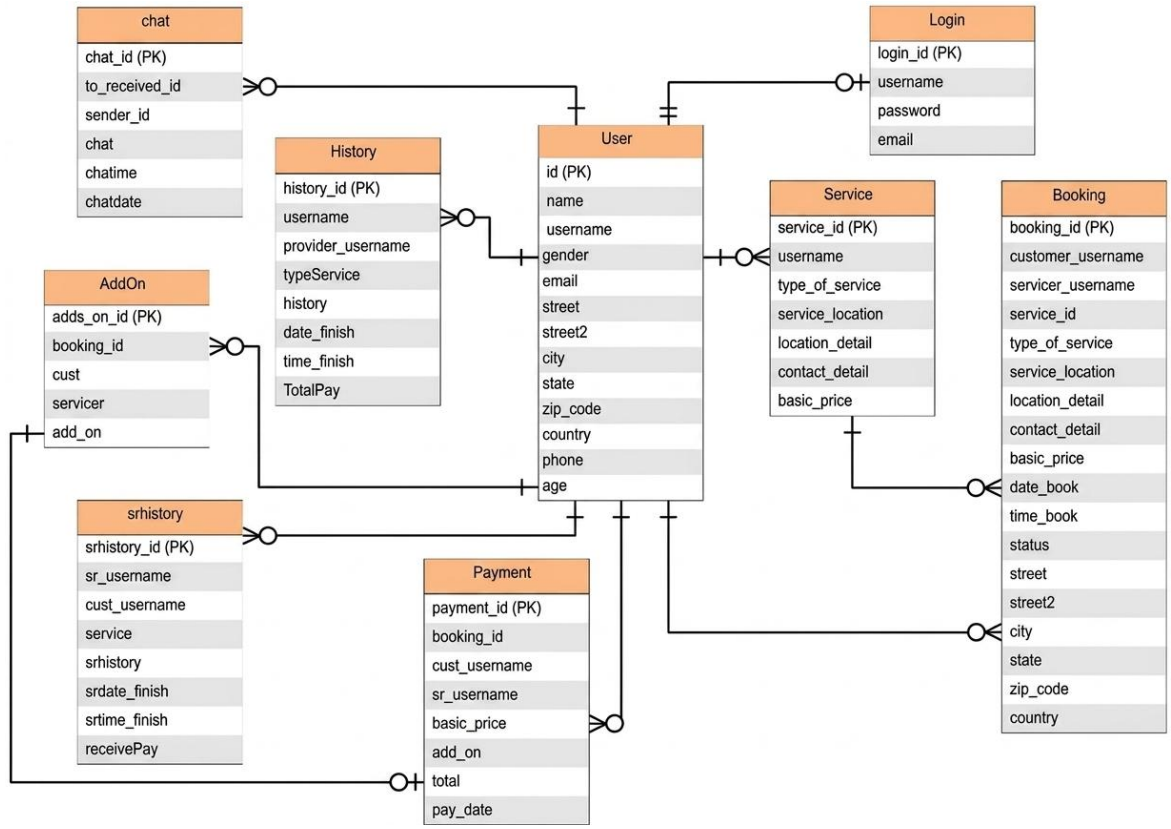

Figure 4. Entity relationship diagram

5.3. Interface design

Sublime tools are used to create or edit the cascading style sheets (CSS). Since Android is the most widely used smartphone and tablet operating system [23] and majority of people prefer mobile app compared to websites [24], the prototype layout is designed for mobile resolution. The UI contains an internal messaging system for users to communicate, search option to locate specific service providers (Figure 5). The providers can create the offered service by entering relevant information and it will be listed in the app for the clients to book once the admin approved the service (Figure 6).

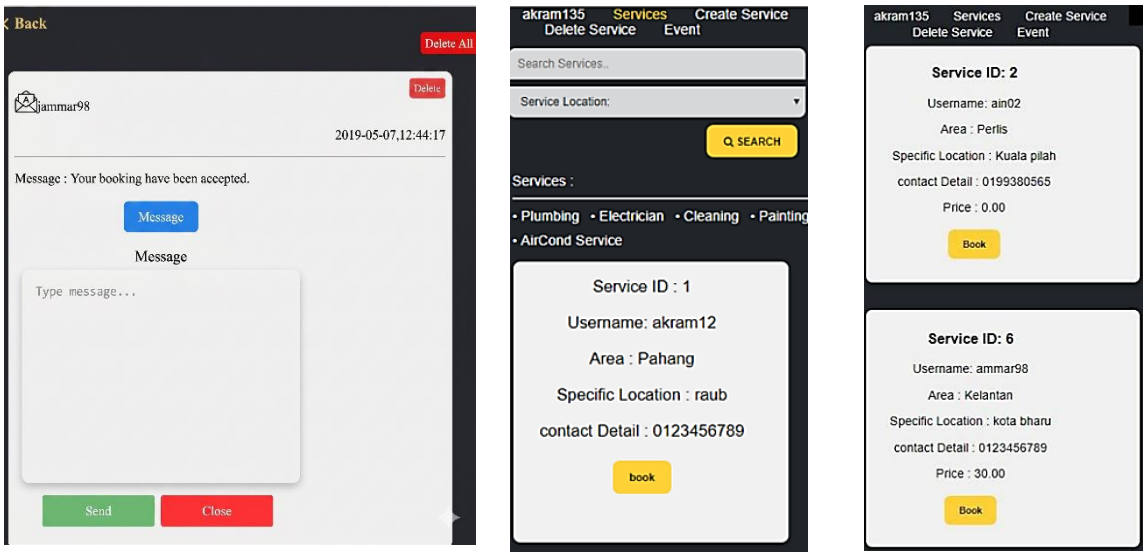

Figure 5. Message system, user search, and service listing

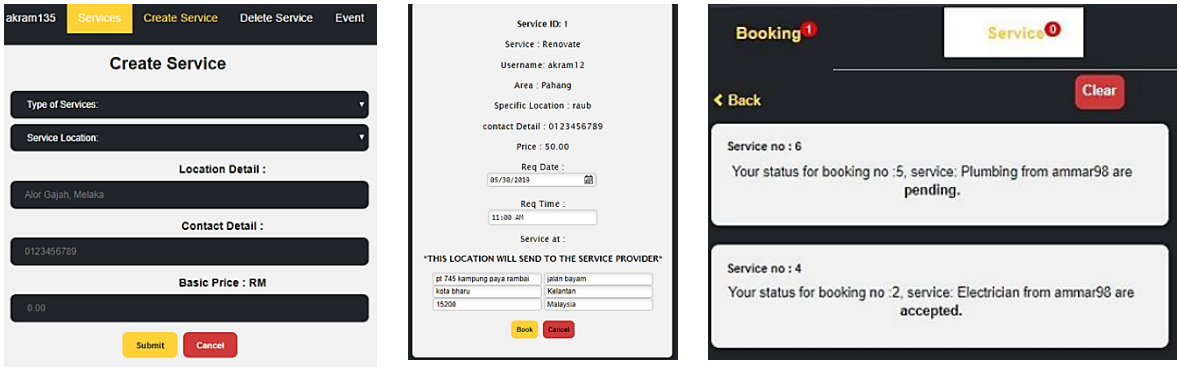

Figure 6. Service creation and booking page and status

6. RESULTS AND DISCUSSION

A user acceptance test is conducted to comprehend the intention and satisfaction level of the prospective users [25]. Thus, this process is carried out in two residential areas in Kota Bharu, Kelantan and area around Pasir Puteh, Kelantan. 30 people are randomly selected at the residential area to be a tester to this product. The target user are people living in residential area with age around 20 to 49. Evaluation is scheduled into four stages; unit test, system test, acceptance test, and integration test. The evaluation procedure does not require the respondent to know the inward working of the item while the respondent just need to realize what is the reaction that they have to give and what are the anticipated results ought to be. Accordingly, the respondents are prepared with a set of questionnaires. Table 2 shows the level of evaluation for the questionnaire's items.

Table 2. Rating scale

1	2	3	4	5
Strongly disagree	Disagree	Natural	Agree	Strongly agree

In order to identify the level of user satisfaction towards the prototype, functionality and usability testing are performed (Figure 7). Figure 7(a) illustrates results of functionality testing. The average scale of the overall website is working correctly is 4.10, where 5 choose natural, 17 peoples agree and 8 peoples ticked strongly agree. The average scale for readability form is 3.73, 4 peoples ticked strongly agree, 15 people agree, 10 became natural and 1 disagree. The usability test result (Figure 7(b)) concerns concern whether the navigation is easy visible, consistency and legibly of the content. For navigation and consistency,

with average 3.63 shows that most people slightly agree with the navigation with 14 respondents choose natural, 13 agree and 3 strongly agree. Content legibly with no grammar error got average 3.87, the highest people choose agreed with 17, 3 people with strongly agree and 11 with natural. Based on the result of usability test, the proposed system has is not reach the usability level because during the testing most respondents comment about limitation of language.

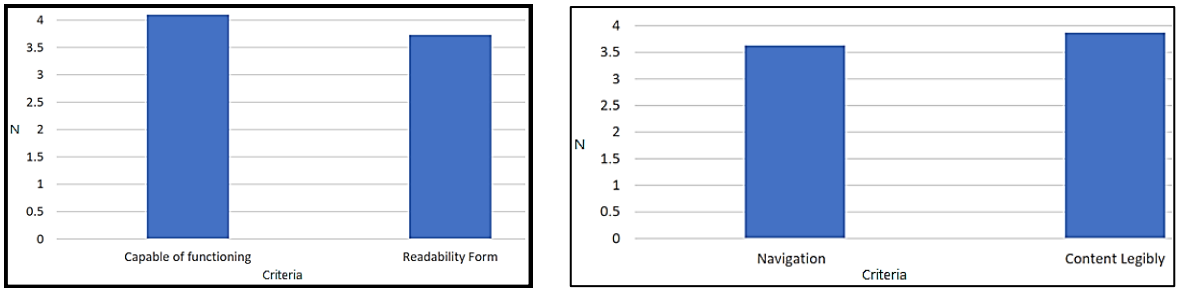

Figure 7. Evaluation results; (a) functionality testing and (b) usability testing

Figure 8 shows the results of interface and compatibility testing. Basically, based on the Figure 8(a), the average of output display correctly is 4.1, with the highest score of 26 people chose 'agree' while 3 respondents picked 'natural' and two 'strongly agree. Based on the average result, it shows that peoples are slightly agreeing with the output display of the system. The testing of consistency of the interface with no service denial received an average between 3.5 to 4.0. In other words, most respondents agreed with the interface consistency. Figure 8(b) shows the bar chart of average of compatibility testing. The result of different browser compatibility with average 4.0. The highest choose is agree with fourteen respondents while natural and strongly agree stated by eight respondents each. The web application was tested with different OS and the average of 4.03, with four respondents picked natural, 21 people selected agree and 5 with strongly agree. Based on the result given by the tester, this system is compatible with different browsers and operating systems without giving effect to the functionality, usability and interface of the system itself.

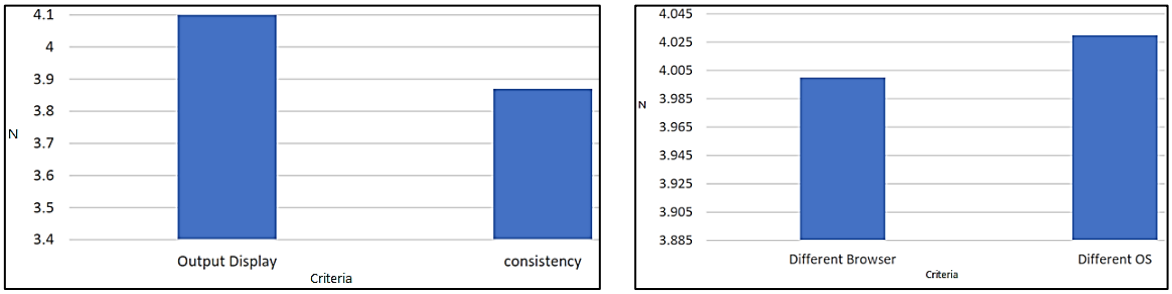

Figure 8. Evaluation results; (a) interface testing and (b) compatibility testing

Overall, based on the evaluation results of functionality, usability, interface, and compatibility, the prototype has successfully meet the requirements. Most comments received from participants are related to communication with the service provider which is can be solved using the chat system. In summary, the results indicate that the prototype design and functionalities are well accepted by the respondents. Future research could explore artificial intelligent-driven task matching, mobile app integration, and real-time feedback systems to enhance user experience and efficiency.

7. CONCLUSION

As limited study has been conducted on web-based virtual middleman system for handworker crowdsourcing, this work fills the gaps by explicating the design and development of micro tasking online crowdsourcing platform for handymen. Module, navigation, and interface design are presented. Collectively, results from the usability testing indicate there is an encouraging potential and opportunity of the adoption of

crowdsourcing platform among handworkers. The study not only identifies key technical requirements and design principles but also demonstrates strong user acceptance in terms of functionality, usability, and compatibility. The findings open up promising avenues for scaling and adapting the system to other service domains, such as rural labor networks, emergency repair services, or even vocational training platforms. Additionally, the transferable framework presented could inform policy-making, urban workforce planning, and inclusive digital economy initiatives, making this study a valuable contribution to both academic literature and practical innovation in crowdsourcing systems. While the developed prototype demonstrates promising usability and functionality, the study is limited by its focus on basic evaluation metrics without incorporating performance indicators such as task completion rate, latency, or long-term user engagement. Additionally, the system was tested in a controlled environment with a limited user base, which may not fully represent real-world usage scenarios. Future research should explore more comprehensive performance evaluations, scalability testing, and integration with mobile platforms to enhance accessibility.

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AUTHOR CONTRIBUTIONS STATEMENT

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [F.N.A] upon reasonable request.

REFERENCES

[1] J. Sasak and P. Pypłacz, "Crowdsourcing in local government units," *Hyperion International Journal of Econophysics & New Economy*, vol. 9, no. 2, pp. 185-198, 2016.
[2] T. Reggiani and R. M. Rilke, "Designing Donation Incentive Contracts for Online Gig Workers," *Journal of Business Ethics*, vol. 190, pp. 553–568, 2023, doi: 10.1007/s10551-023-05428-7.
[3] G. B. Schmidt, J. Philip, S. A. V. Dellen, and S. Islam, "Gig worker organizing: toward an adapted Attraction-Selection-Attrition framework," *Journal of Managerial Psychology*, vol. 38, no. 1. pp. 47-59, doi: 10.1108/JMP-09-2021-0531.
[4] G. Wagner, J. Prester, and G. Paré, "Exploring the boundaries and processes of digital platforms for knowledge work: A review of information systems research," *The Journal of Strategic Information Systems*, vol. 30, no. 4, 2021, doi: 10.1016/j.jsis.2021.101694.
[5] I. Taufik, M. Jaenudin, F. U. Badriyah, B. Subaeki, and O. T. Kurahman5, "The search for science and technology verses in Qur'an and hadith," *Bulletin of Electrical Engineering and Informatics*, vol. 10, no. 2, pp. 1008–1014, 2021, doi: 10.11591/eei.v10i2.2629.

[6] "The New World of Building Design," AEC Business, Feb. 18, 2013. [Online]. Available: https://aec-business.com/the-new-world-of-building-design/. (Accessed May 01, 2023).
[7] W. Li, W. J Wu, H. M. Wang, X. Q. Cheng, H. J. Chen, Z. H. Zhou, and R. Ding, "Crowd intelligence in AI 2.0 era," *Frontiers of Information Technology & Electronic Engineering*, vol. 18, pp. 15–43. 2017, doi: 10.1631/FITEE.1601859.
[8] C. E. Connelly, C. Fieseler, M. Černe, S. R. Giessner, and S. I. Wong, "Working in the digitized economy: HRM theory & practice," *Human Resource Management Review*, vol. 31, no. 1, pp. 1–7, doi: 10.1016/j.hrmr.2020.100762.
[9] K. Huang, J. Yao, and M. Yin, "Understanding the Skill Provision in Gig Economy from A Network Perspective," in *Proceedings of the ACM on Human-Computer Interaction*, 2019, pp. 1–23, doi: 10.1145/3359234.
[10] W. A. M. Borst, *Understanding Crowdsourcing: Effects of motivation and rewards on participation and performance in voluntary online activities*, RIM Ph.d. Series Research in Management, 2010.
[11] N. Koutsimpogiorgos, K. Frenken, and A. M. Herrmann, "Platform adaptation to regulation: The case of domestic cleaning in Europe," *Journal of Industrial Relations*, vol. 65, no. 2, pp. 156–184, 2023, doi: 10.1177/00221856221146833.
[12] P. Konhäusner, "Crowdsourcing in Sustainable Retail—A Theoretical Framework of Success Criteria," *Journal of Risk and Financial Management*, vol. 14, no. 2, pp. 1-21, 2021, doi: 10.3390/jrfm14020087.
[13] H. Zheng, D. Li, and W. Hou, "Task Design, Motivation, and Participation in Crowdsourcing Contests," *International Journal of Electronic Commerce*, vol. 15, no. 4, pp. 57–88, 2011, doi: 10.2753/jec1086-4415150402.
[14] J. Healy, D. Nicholson, and A. Pekarek, "Should we take the gig economy seriously?" *Labour & Industry: a journal of the Social and Economic Relations of Work*, vol. 27, no. 3, pp. 232–248, 2017, doi: 10.1080/10301763.2017.1377048.
[15] M. Hossain, "Users' motivation to participate in online crowdsourcing platforms," in, 2012 *International Conference on Innovation Management and Technology Research*, Malaysia, 2012, pp. 310-315, doi: 10.1109/ICIMTR.2012.6236409.
[16] M. Dunn, I. Munoz, and M. H. Jarrahi, "Dynamics of flexible work and digital platforms: Task and spatial flexibility in the platform economy," *Digital Business*, vol. 3, no. 1, pp.1-10, 2023, doi: 10.1016/j.digbus.2022.100052.
[17] D. J. Bunders, M. Arets, K. Frenken, and, T. De Moor, "The feasibility of platform cooperatives in the gig economy," *Journal of Co-operative Organization and Management*, vol. 10, no. 1, pp.1-8, 2022, doi: 10.1016/j.jcom.2022.100167.
[18] D. Zhai *et al.,* "Towards secure and truthful task assignment in spatial crowdsourcing," *World Wide Web*, vol. 22, no. 5, pp. 2017–2040, 2019, doi: 10.1007/s11280-018-0638-2.
[19] R. Musvosve, M. Turpin, and J. P. V. Belle, "Platform Economy Employment Opportunities for Youth in the Global South," in *2023 Ninth International Conference on eDemocracy & eGovernment (ICEDEG)*, Quito, Ecuador, 2023, pp. 1-7, doi: 10.1109/ICEDEG58167.2023.10122096.
[20] M. Graham and J. Woodcock, "Towards a Fairer Platform Economy: Introducing the Fairwork Foundation," *Alternate Routes*, AU Press, vol. 29, 2018, pp. 242–53.
[21] R. W. Abdullah, S. Ahmad, S. A. Asmai, S. W. Lee, and Z. M. Zain, "Research efforts and challenges in crowd-based requirements engineering: a review," *Journal of Systems and Software*, vol. 12, no. 9, pp. 395–402, 2021, doi: 10.14569/IJACSA.2021.0120945.
[22] N. A. Rahim and H. Rahmalan, "Efficient donation, sustainable impact: unveiling the clothes recycle management system," *Journal of Advanced Computing Technology and Application (JACTA)*, vol. 6, no. 2, pp. 14–24, 2024, doi: 10.54554/jacta.2024.06.02.002.
[23] H. M. Nasir, N. M. A. Brahin, F. E. M. Sani, M. S. Mispan, and N. H. A. Wahab, "AI educational mobile app using deep learning approach," *JOIV: International Journal on Informatics Visualization*, vol. 7, no. 3, pp. 952–958, 2023, doi: 10.30630/joiv.7.3.1247.
[24] A. I. Musa *et al.*, "Development of mobile based flood victims medical management system." *International Journal of Engineering Trends and Technology*, vol. 70, no. 8, pp. 71-82, 2022, doi: 10.14445/22315381/IJETT-V70I8P207.
[25] U. N. Hashim, L. Salahuddin, R. R. R. Ikram, U. R. Hashim, H. C. Ngo, and M. H. N. Mohayat, "The design and implementation of mobile heart monitoring applications using wearable heart rate sensor," *International Journal of Advanced Computer Science and Applications*, vol. 12, no. 1, 2021, doi: 0.14569/IJACSA.2021.0120120.

APPENDIX

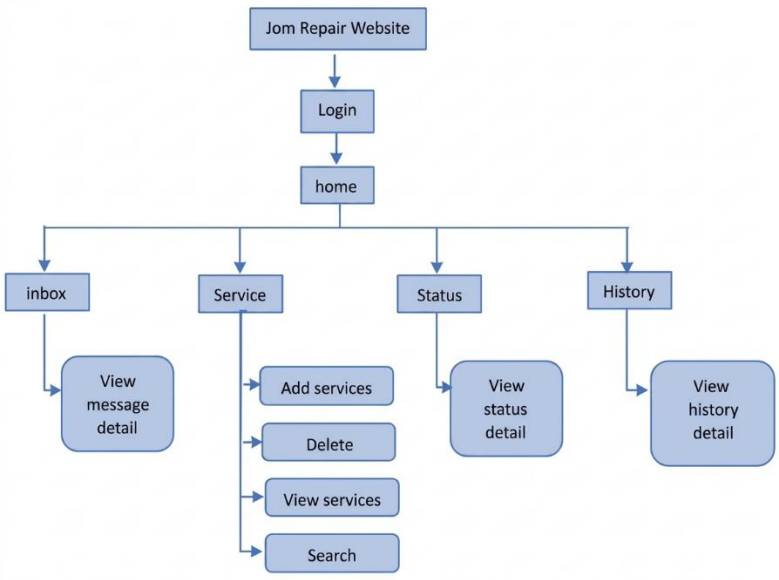

Figure 3. System structure

BIOGRAPHIES OF AUTHORS

Muhammad Akram Bin Mat Lazim is a student researcher at Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka (UTeM). His solid foundation in HTML, CSS, JavaScripts, and PHP enables him to honed his skills in crafting responsive layouts and interactive features. He is eager to undertake challenging projects that push the boundaries of web development, whether it's building dynamic web applications or designing intuitive user interfaces. His problem-solving skills and attention to detail allow him to tackle complex coding challenges with creativity and precision. He is excited to embark on new projects and contribute to the ever-evolving landscape of web development. He can be contacted at email: akramm97@gmail.com.

Farah Nadia Azman holds the position as a senior lecturer at the Department of Interactive Media, Faculty of Information and Communication Technology, UTeM. She obtained her Ph.D. in Multimedia from Universiti Utara Malaysia on 2017, specializing in media production methods. Her research interests span from edutainment, intelligent media computing to digital entrepreneurship. By combining her expertise in web and mobile systems, and a deep appreciation for entrepreneurial spirit, she is interested in creating solutions that align seamlessly with the unique goals and vision of each business. In addition, through her knowledge of UX design, she crafts compelling digital experiences that captivate audiences and drive desired actions. She can be contacted at email: farah@utem.edu.my.