Halal Certificate Readiness Assessment (HaCeRa) Tool:

Towards Automation of the Halal Application Process

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Abstract— Business owners are concerned that obtaining Halal certificates will be a time-consuming, complicated, and lengthy process. The time it takes to assemble the large quantity of documents and evidence required to qualify for the Halal certification process is one of the main issues. The design and development of a web-based tool, Halal Certificate Readiness Assessment (HaCeRa), to aid in the automation of the Halal certificate readiness assessment process will be discussed in this paper. This could alleviate some of the problems and make it easier for company owners to obtain a Halal certificate. For food premises, food product producers, and Small and Medium Enterprises (SME) categories, the system serves as a thorough Halal readiness assessment. The HaCeRa provides a comprehensive checklist that contains all the necessary information and documents for the Halal certification assessment. HaCeRa also visualises the Halal readiness progress based on the Halal certificate checklist to assist them to get their Halal certification. HaCeRa includes visualizations of Halal readiness progress based on the Halal certification checklist to help expedite preparation and inform potential Halal applicants of their present status. The HaCeRa system also supports the Halal consultants, allowing them to keep track of their clients' progress and provide reports and summaries of their clients' readiness assessments based on the clients' assessment records.

Keywords— *readiness, assessment, Halal certification, Halal readiness*

I. INTRODUCTION

This rapid growth of the halal industry has encouraged entrepreneurs and business enterprises to engage in Halal food productions. In some districts in Malaysia, there have been rules that food entrepreneurs are required to have Halal certification, such as Putrajaya that imposes halal certification on food premises in 2020. Nonetheless, some food producers refuse to apply for Halal certificates due to the tedious procedure and lack of guidelines [1]. Halal certification manuals are complicated and lead to many entrepreneurs having trouble in understanding the Halal certification process, particularly for non-Muslims [2].

A few restaurant managers who had gone through the process of applying for halal certification said they had to wait six months for the certificate, there were a lot of stages to go through, and they had to pay a lot of money [3]. Furthermore, some other problems regarding the halal application include problems such as poor documentation management, insufficient knowledge, and skills in using online technology, and negligence [4]. Due to these obstacles, there is a significant tendency among potential applicants to give up their intention to apply for Halal certificates.

As a result, HaCeRa is proposed to assist potential Halal applicants in determining their Halal readiness stage before submitting a Halal application. In summary, the HaCeRa tool is a web-based system that gives a comprehensive checklist of all Halal certification requirements. This checklist is developed by the University of Malaya Halal Research Center (UMHRC). One of the services provided by the UMHRC is to consult the potential Halal applicants with regard to the application process.

In addition, the applicant shall also be able to evaluate whether or not they are ready to start the Halal certification process. Note that under the Halal certification, businesses are categorized into four categories, namely the multinational with more than RM 50 million annual turnovers, the medium category with RM 15 to RM 50 million annual turnovers, the small category with RM 300,000 to RM 14 999.99, and lastly the micro category with less than RM 300,000 annual turnover.

This project focuses on (1) the micro category for food premises, food products, (2) potential applicants to prepare themselves upon applying for Halal Jabatan Kemajuan Islam Malaysia (JAKIM) certificates, and (3) organizations with less than 5 employees. Because the UMHRC is the system's key stakeholder, the consultant is their primary role in the system. In addition to that, the company also requires

managers to have a higher access level compared to the consultants in terms of managing the applications, and the administrator's role to manage the user profiles and other administrative tasks.

Thus, the system also could support the Halal consultants to assist their clients in obtaining the Halal certificate, as well as providing data visualization and reporting on their progress.

The objectives of the HaCeRa project are:

I. to design and develop a web-based system that can be used to facilitate the Halal applicants;
II. to allow the applicants to monitor their Halal readiness assessment progress before they apply for JAKIM Halal certification;
III. to provide the visualization for the Halal consultants to review the progress of their clients;
IV. to provide a centralized platform for all the relevant Halal assessment information for documentation and reporting purposes.

It is worth noting that this project is a collaboration with the UMHRC. This paper will discuss the design and development of the HaCeRa system to automate the Halal readiness assessment.

The paper has been organized into 5 sections. In Section 1 and 2, the introduction of the work and the review of previous work are presented. Subsequently, methodology and future work are discussed. Finally, the conclusion is provided at the end.

II. Review of Previous Work

Even though there are various Halal consulting companies such as those registered under the Malaysia International Halal Academy (MIHA), JAKIM, or those who are not who; and Halal requirements checklists are easily available and accessible, most online readiness checklist coverage is insufficient, and comprehensive checklists only provide physical documentation to fill out, according to our findings. In addition, to grasp and discern how to apply the checklist depending on categories like food premises, food products, cosmetics products, and others, the potential applicants require a significant level of knowledge. A more detailed discussion is provided in the following subsections.

A. *Halalan Quality Consultant PLT*

Halalan Quality Consultant (HQC) have experts in Halal trade [8]. As shown in Fig.1, the company has Halal advisory consultancy which is recognized under MIHA (JAKIM), Halal e-commerce platform, Halal training, and human capacity development, and Halal mart.

Based on our investigation, the Halal certification service offered by the company provides Halal readiness assessment or guidance to the public as a part of their consultancy services. The company uses the terms pre-confirmation process and the desk audit review to denote the Halal readiness assessment. Nonetheless, clients are expected to consult them to get the service.

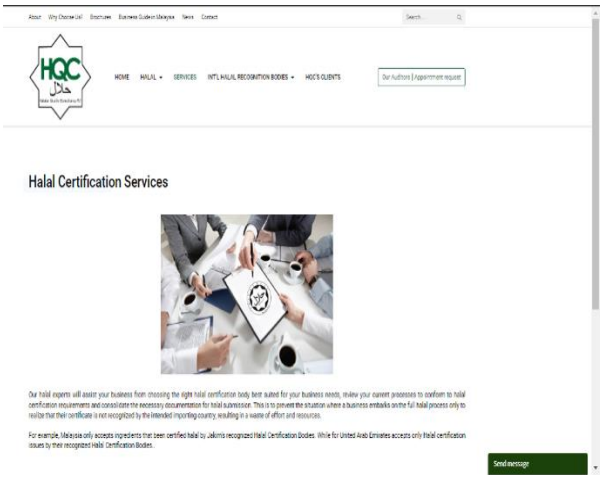


Fig. 1 Halal Quality Consultant PLT

B. *Halal Consultancy Cheng & Co.*

Halal Consultancy Cheng & Co. provides the firm's services, production facilities, retail premises, production process, and ingredients for Halal certified [7]. The company aids its clients in getting Halal certificates through the Halal certification process starting with preparation, submission, processing, and post-certification. They also provide the services from setting the Halal team until the process of Halal certificate renewal certificate. Similar to the previous consultant company, Halal readiness assessment is also a part of the services that they provide to their potential Halal applicants.

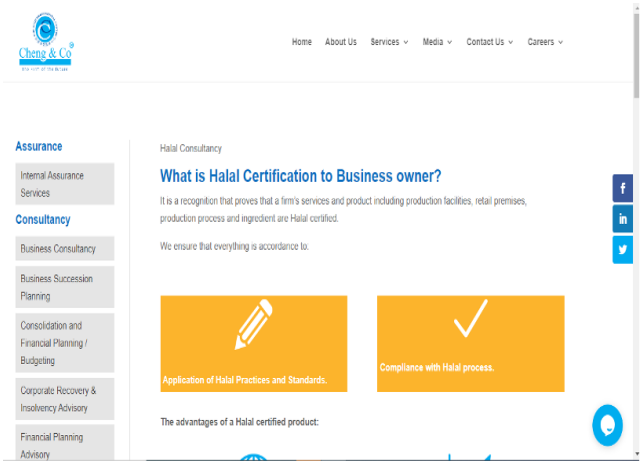


Fig. 2 Halal Consultant Cheng & Co

C. *Halal Internal Audit Checklist (Malaysia)*

Halal Internal Audit Checklist is offered from the iAuditor system by Safety Culture [9]. The system can be accessible at https://app.safetyculture.com/dashboard. The system is designed to cater to various types of auditing or similar

exercises and is not only specialized in Halal auditing or Halal inspection.

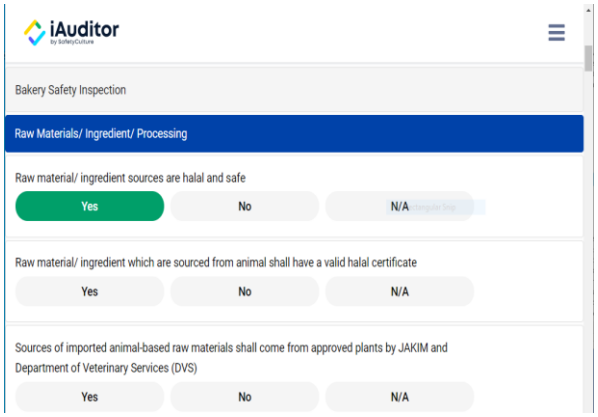


Fig. 3 Sample interface of Halal Checklist iAuditor

As depicted in Fig. 3, the checklist can be used from an existing template or users can customize any template from the website. See Fig. 4.

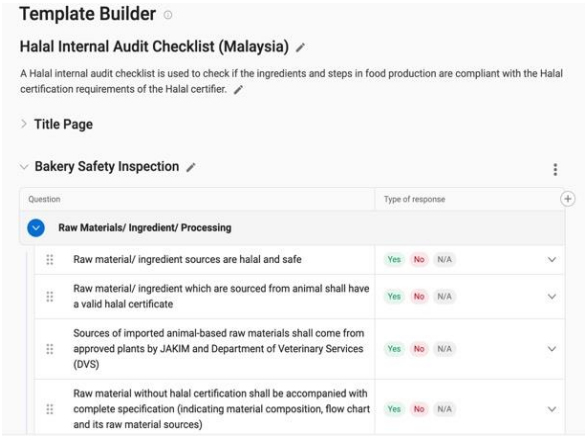


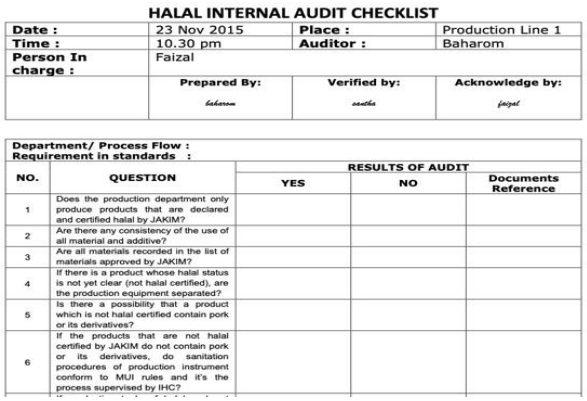
Fig. 4 Customization of the Checklist Template

The system allows its user to create and customize their Halal checklist. The generic Halal checklist consists of general information on what is needed in getting the Halal certificate. Nonetheless, the checklist excerpt as shown in Fig. 4 is insufficient in terms of Halal readiness information. The existing online checklist also does not cover different categories of Halal application as defined in the JAKIM Halal certification application process [10]. In addition, even if users are able to customize the checklist, they need to refer to the accurate Halal guidelines as defined by JAKIM [10]. Hence, relevant knowledge is required in order to customize the template.

D. Halal Assurance System

The Halal Assurance System (HAS) consists of comprehensive information on the rules, requirements, references, and checklists of Halal JAKIM readiness assessment [5]. The HAS provides the overall Halal relevant process and is not being implemented as a computer system. Users could read the provided guideline to gather information on applying Halal certificates.

Nonetheless, the Halal checklist is provided in the form of a template file (see Fig. 5), which users need to read, print the files, and complete the checklist on their own in order to perform the Halal readiness assessment.



HALAL INTERNAL AUDIT CHECKLIST

Date :	23 Nov 2015	**Place :**	Production Line 1
Time :	10.30 pm	**Auditor :**	Baharom
Person In charge :	Faizal		
	Prepared By: baharom	**Verified by:** aastha	**Acknowledge by:** faizal

Department/ Process Flow :
Requirement in standards :

NO.	QUESTION	RESULTS OF AUDIT YES	NO	Documents Reference
1	Does the production department only produce products that are declared and certified halal by JAKIM?			
2	Are there any consistency of the use of all material and additive?			
3	Are all materials recorded in the list of materials approved by JAKIM?			
4	If there is a product whose halal status is not yet clear (not halal certified), are the production equipment separated?			
5	Is there a possibility that a product which is not halal certified contain pork or its derivatives?			
6	If the products that are not halal certified by JAKIM do not contain pork or its derivatives, do sanitation procedures of production instrument conform to MUI rules and it's the process supervised by IHC?			

Fig. 5 Sample of Halal Internal Audit Checklist [5]

This is considered a manual or conventional way of performing the Halal readiness assessment process. This way, the progress needs to be manually monitored, and consultants need to be referred from time to time based on the manual assessment. This might take a long time and a lot of effort to complete the whole process.

Table 1 provides a comparison between the similar work with the intended project. As listed in the comparison table, only the Halal Assurance Readiness Assessment System has an online checklist feature for the Halal readiness assessment. According to the HaCeRa system's objectives, it will contain a comprehensive Halal requirements checklist as provided by the domain experts, visualization for consultants and managers to help them track their clients' progress, and applicants shall be able to track their own Halal requirement checklist progress.

TABLE I
COMPARISON OF EXISTING SYSTEMS

No.	Main Features				
	Existing systems	**1**	**2**	**3**	**4**
1	Halal Quality Consultant PLT	×	×	×	×
2	Halal Consultancy Chang & Co.	×	×	×	×
3	Halal Internal Audit Checklist (Malaysia)	√	×	√	×
4	Halal Assurance System	×	×	×	√

*Legend: 1- Online checklist/assessment, 2- Visualization, 3-Monitoring, 4-Comprehensive checklist

The comprehensive checklist that is adopted in this work consists of JAKIM Halal requirements and other relevant reference documents such as the Manual Halal Certification Procedure Manual 2020 (Domestic), Ms 1500:2009 Halal Food - Production, Preparation, Handling and Storage - General Guidelines (Second Revision), and Food Hygiene Regulation 2009. The rest of the existing work mainly depended on JAKIM Halal requirements only. As the focus of this work is not on the checklist content, we exclude the discussion on the checklist items.

In addition, the HaCeRa system also could provide references and sample images of the required documentation.

III. Methodology

According to Kara and Helen [11], Gierson et. Al [6] methodology is "'a contextual framework' for research, a coherent and logical scheme based on views, beliefs, and values, that guides the choices researchers [or other users] make". The methodology is needed as a guide to develop the system. In designing and developing the HaCeRa system, a prototyping methodology had been applied. This methodology is chosen because the prototype serves as a basis for deriving a system specification [12] [19].

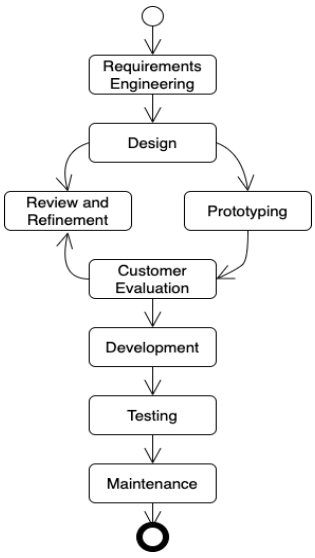


Fig. 6 Prototyping Model

Based on Fig. 6, the phases in the prototyping methodology start with understanding the stakeholders and the system requirements in the requirements engineering phase. Following that, in the design phase, a prototype will be created and evaluation from the users will be included as feedback. This feedback will be used to review and refine the prototype. Prototyping can be considered as a risk reduction activity, where missing functionality can be identified. Hence, this can help to reduce the risk of failure.

The real system will be further developed, tested and maintenance will be conducted. It is also worth noting that the HaCeRa is developed as a proof of concept that the Halal readiness assessment is feasible to be developed to achieve its objectives. Another justification of this prototyping methodology is that customers can have the look and the feel of the potential product at an earlier stage before the real development starts.

The following subsections elaborate on each of these phases in the prototyping methodology.

A. Requirements Engineering (RE) Phase

In the RE phase, the needs of the stakeholders are identified and analyzed. RE phase involves a few activities including requirements elicitation, documentation, validation, negotiation, and management.

At the beginning phase in requirements elicitation, the preliminary discussion was conducted with the domain experts, including the Director of the University of Malaya Halal Research Centre (UMHRC) and the team. The center specializes in the Halal certification process as well as the main stakeholder for this project. The main goal for the preliminary discussion was to set the goals and scope of the work.

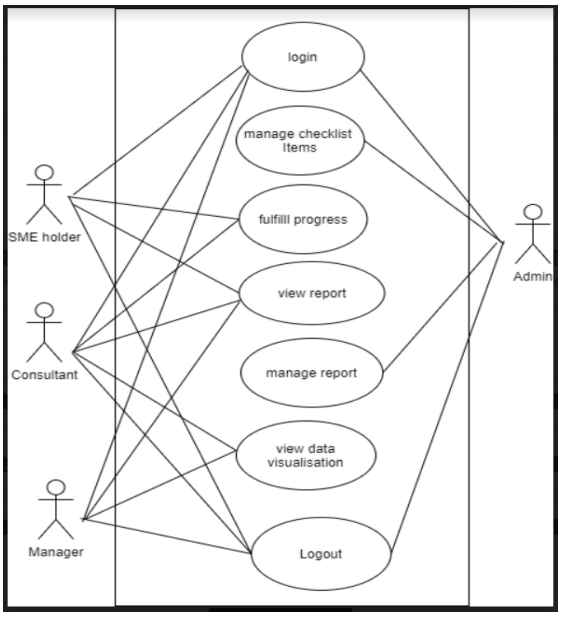


Fig. 7 Use Case Diagram for HaCeRa

In addition to the preliminary discussion, a few sessions of interviews were also conducted. The goal of this interview session was to understand the needs of the stakeholders of the system i.e. consultants, managers, users (SME), and administrators. The stakeholders' roles will be elaborated on in the subsequent part. During requirements

documentation, based on these elicitation techniques, a list of requirements is derived and documented.

A use case diagram is provided as a high-level view of the stakeholder, which conveys the behaviors of the system that must be performed. Fig. 7 depicts the use case diagram for the HaCeRa system. This use case describes the actors, main features, and interactions between actors and use cases in the HaCeRa system.

The following paragraphs elaborate on the stakeholders of the system, and the main features of the HaCeRa system

I) Stakeholders of the HaCeRa system

SME: SME holders need to create an account in the HaCeRa system and log into the system. Then, they are able to provide the checklist assessment, and view the progress they made based on the checklist in the HaCeRa system. Upon printing the progress, a report is generated for the SME Holders to be able to document their progress.

Consultant: Consultants are employees of a Halal consultancy company, in this case, is the staff of UMHRC. UMHRC is a JAKIM's recognized Halal training provider and registered under Malaysia International Halal Academy, JAKIM as a coach for the Halal certification. In the case where potential clients are not able to provide their assessment, the consultants are able to fill in the Halal readiness assessment for them. In addition, consultants could also be able to monitor their client's progress.

Manager: Managers are one of the higher authorized users in the consultancy company to monitor the potential applicants. Managers could view the progress report of the applicants and data visualization of the assessment progress.

Admin: An administrator manages the Halal requirements checklist. He could add, delete, and update the halal requirement checklist and have the highest authority in the HaCeRa system.

II) Features of the HaCeRa

Log in and Log out: SME holders need to create their account into the system to be able to log in and save their progress. Consultants use their clients' IDs to log into the system, fill, and monitor the clients' progress. Each role will be directed to its respective interfaces.

Manage profile: All users shall be able to create and manage their accounts to access the HaCeRa system.

Manage checklist Items: Only administrators could update the Halal requirements checklist. Administrators could add any checklist requirements, delete any outdated requirements and references. References are needed to guide the user on the required documents and checklists information.

Manage readiness assessment: SME holders and consultants are able to fill in their assessment or their client's assessments in the provided checklist. The progress can be stored and monitored from time to time.

View report: SME holders could view their progress report. Consultants and managers could be able to view their clients' reports.

Manage report: Managers are able to generate clients' progress reports. Administrators are also able to customize the information needed on the progress report.

View visualization: Consultants and managers are able to view their clients' progress in the form of pie charts. ß

B. Design Phase

For this project, three design stages were conducted that are (1) database design, (2) architectural design, and (3) interface design. The following parts will briefly elaborate on the design stages.

I) Database design

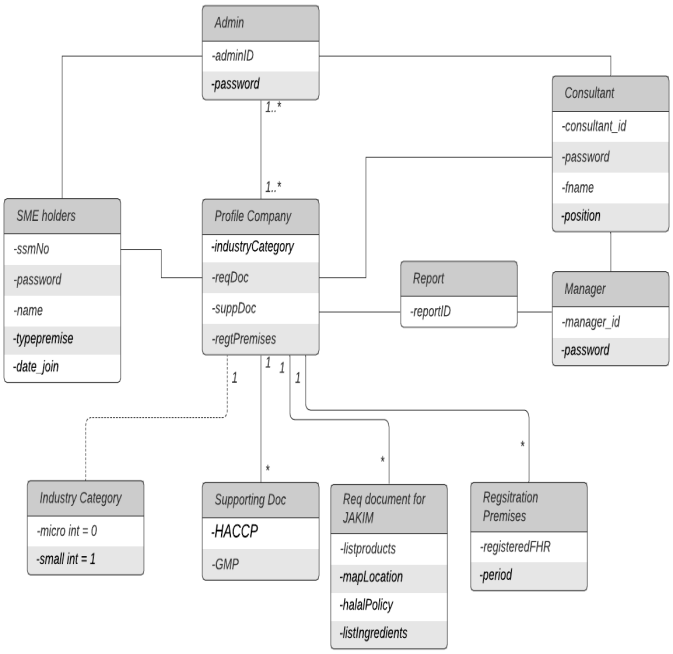


Fig. 8 Entity Relationship Diagram

Fig. 8 represents the database design created for the project based on the requirements provided by the stakeholders. The database design represents the entities and their relationships in the system. These entities will, later on, be implemented as persistent database tables in the implementation.

II) Architectural design

Based on Fig. 9, users interact with the HaCeRa web application interface via the first tier i.e. the presentation later.

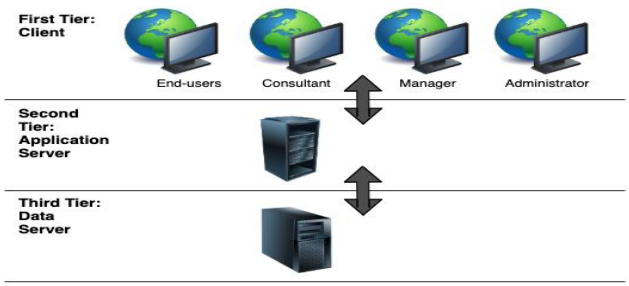


Fig. 9 System architectural design

The second tier communicates the interactions from the presentation layer to be processed. The third tier fetches the required data from the database and returns the result to the second tier. The HaCeRa web application displays the information in the presentation layer for the users to view. The justification for adopting this three-tier architecture is to ease maintenance in the future as each layer has its intended purposes and dedicated functions.

III) Interface design

The interface design is the design from the stakeholders' views [20]. Figures 10 and 11 are examples of the interface designs for the HaCeRa system, which were designed using the Proto.io tool.

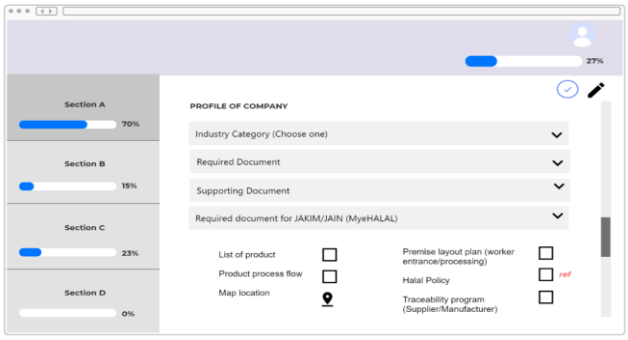


Fig. 10: User Interface Design for Checklist-1

Interface designs for the SME holders, consultant, manager, and administrator views were created.

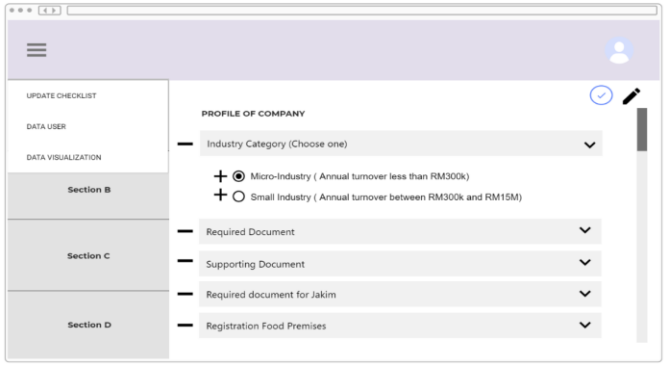


Fig. 11 User Interface Design for Checklist-2

The interface designs were displayed to the stakeholders so that they could see and understand how the administrators, SME holders, and consultants could view the HaCeRa system's interface and determine whether the features and requirements met their needs. From this, feedback was gathered to improve the design.

C. Prototyping Phase

The preliminary design was the low-fidelity prototype of the project from the design. This is usually a scaled-down system and represents an approximation of the characteristics of the final product.

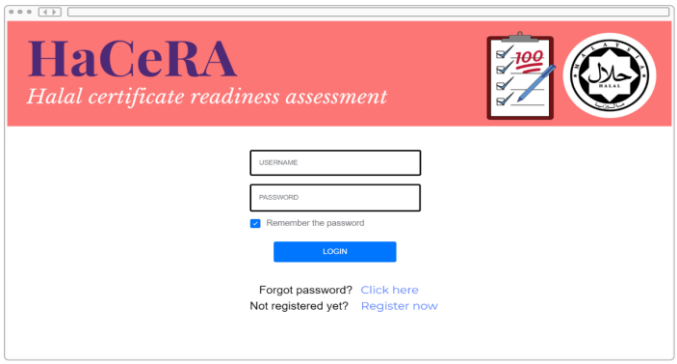


Fig. 12 Login page

Fig. 13 Checklist page

Figures 12 and 13 represent samples of the low-fidelity prototype design.

D. Stakeholder Evaluation Phase

The stakeholders evaluated the prototype and provided their feedback, the prototype's strengths, and weakness, features or design that needs to be added and need to be removed from the prototype. Based on the feedback given by the stakeholders, the prototype was designed accordingly to their preferences and needs. The feedback given by the stakeholders is recorded and documented to be the reference on making the HaCeRa system.

E. Review and Refinement Phase

Based on the comments provided by the domain expert and other stakeholders, the prototype was updated. The updated prototype was evaluated in the same manner as the earlier prototype in the following cycle.

F. Development Phase

Once the stakeholders were satisfied with the prototype to represent the final product, the final system was developed. For the development, Laravel was adopted as the development framework. In addition, for coding, Visual Studio Code editor [18] was used for various coding languages such as HTML, Javascript, and PHP. HaCeRa system also uses MySQL [14] as the database, and Laragon as the development environment [13].

Fig. 14 depicts a sample of the implementation for the administrator's view to manage user profiles.

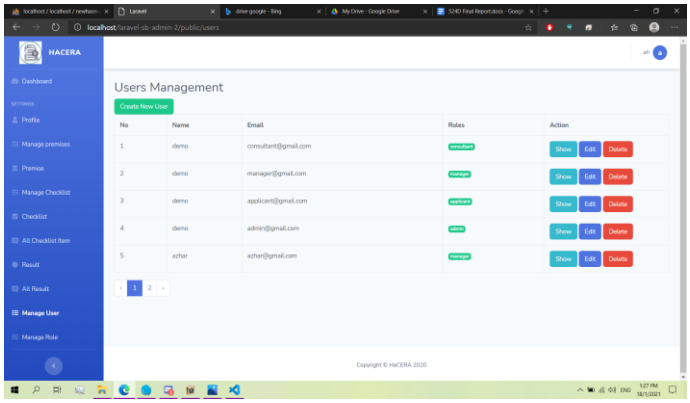


Fig. 14 Manage user page

Fig. 15 shows the implementation of the online checklist assessment from the potential applicant's perspective.

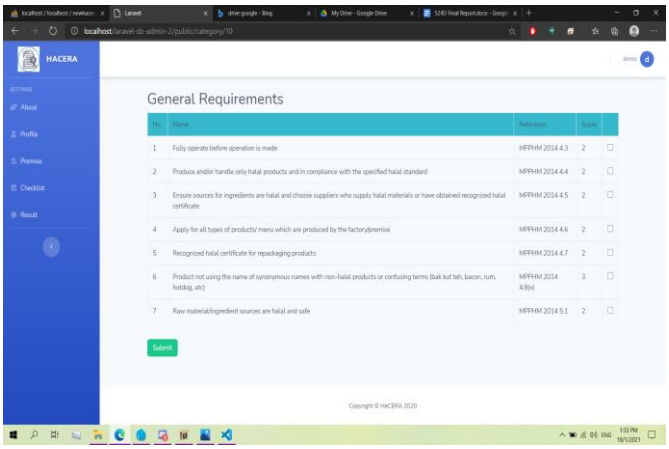


Fig. 15 Checklist assessment

G. Testing Phase

System testing is testing a fully integrated system or software product to validate and evaluate the end-to-end system specifications [15]. The HaCeRa system was tested to see how well the system's features worked and whether there were any errors. Several test cases were created, and tests were executed. Based on the test results, changes were made to correct the detected errors.

IV. Constraints and Future Work

An issue in the implementation is the use of a server for the application and database servers. Due to unavailable access to servers, the current implementation only uses a temporary commercial server service. This limitation has limited further maintenance of the system. To further improve the system, this issue needs to be resolved.

This system is developed to provide a comprehensive checklist on applying Halal JAKIM into a simplified checklist system on food premises to evaluate the applicants' readiness to apply for the Halal certificates. The HaCeRa system simplifies the lengthy list of Halal requirements and provides all the relevant requirements in getting the JAKIM Halal certificates. Nonetheless, the current system only focuses on the food premises category. Thus, working on other categories in the existing Halal requirements would be a potential improvement for the HaCeRa system.

V. Conclusion

This paper presents the process of designing and developing the HaCeRa system using the prototyping methodology. This solution aims to simplify the readiness assessment for the application of the Halal JAKIM certification. The key to develop this web-based system is to completely comprehend the needs of all stakeholders. The implementation of the HaCeRa system provides an effort to convert the manual application process into an automated solution. The automation effort could be viewed as an added value to all the relevant stakeholders in the project.

Acknowledgment

We would like to record our deepest gratitude to the University of Malaya Halal Research Centre (UMHRC) for this collaborative effort and Kulliyyah of ICT, IIUM for the support.

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