

Research Article

Design and Construction of a Web-Based Business Incubator Selection and Evaluation System for Yarsi University

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Received: June 2, 2026; Revision: July 2, 2026;

Accepted: July 6, 2026; Available Online: July 8, 2026

Abstract

The research problem, namely the challenges faced by startups and business incubators in developing entrepreneurial activities within universities, is relevant and supports the motivation for developing the proposed system. The research method, including the use of development research, observation, literature review, and the prototyping approach, is also briefly explained. However, although the abstract covers the main components of the study, the description of the research results is still presented in a general manner. It does not sufficiently explain the specific achievements of the developed system. The author is advised to provide more detailed information on the system's evaluation results, particularly the outcomes from usability or user experience testing. For example, the abstract could specify which UEQ (User Experience Questionnaire) dimensions achieved the highest evaluation scores and explain their implications for the usability, effectiveness, or acceptance of the proposed system. Presenting more specific quantitative results would strengthen the evidence of the system's performance and make the research contribution clearer to readers. Furthermore, several statements in the abstract, such as improvements in innovation and creativity and the development of successful startups, remain broad and appear to be assumptions rather than conclusions directly supported by the research findings. Since the study primarily focuses on the design, development, and evaluation of a web-based business incubator selection and evaluation system, the abstract should emphasize the outcomes achieved through the system's implementation and testing. The conclusion should be more closely connected to the evaluation results to ensure consistency between the research objectives, methodology, findings, and final claims.

Keywords: Business Incubator; Innovation or Creativity; Prototyping; Startup

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1. Introduction

A business incubator is a company or institution that provides a program designed to foster and accelerate the success of business development through a series of capital programs, followed by partnership support and coaching of other business elements to make the business a profitable company, having proper organizational and financial management, and becoming a sustainable company, so that it ultimately has a positive impact on society.

According to the Business Incubation Definition and Principles module, a business incubator is a physical space or facility that supports the incubation of businesses. Meanwhile, according to the National Business Incubation Association (NBIA), business incubators nurture the development of entrepreneurial companies, helping them survive and grow during their early stages, when they are most vulnerable.

Their programs provide client companies with business support services and resources designed for young companies. The most common goals of incubation programs are to create jobs in a community, improve the community's entrepreneurial climate, retain businesses, build or accelerate growth in local industries, and diversify the local economy.

Incubation programs are generally offered to startups or companies in their early stages, which in Indonesia are generally new or have been operating for less than two years. A research study in the United States, where the concept originated, found that 87% of startups that participated in incubation and coaching programs survived and thrived.

The evolution of the internet is one of the most fascinating phenomena in today's technological advancements. One aspect that is arguably central to this evolution is the emergence of electronic commerce (e-commerce) in the business environment. E-commerce is transforming nearly every business function and every activity, from buying and selling to advertising. The advent of e-commerce has made it easier for consumers to conduct transactions without having to go to a physical location.

Electronic commerce (EC) is a new concept that can be described as the process of buying and selling goods or services on the World Wide Web (Shim et al., 2013) or the process of buying and selling or exchanging products, services and information through information networks, including the internet (Turban et al., 2002). (Kalakota & Whinston, 1997) Define EC from several perspectives.

From a communications perspective, EC is the delivery of information, products/services, or payments via telephone lines, computer networks, or other electronic means. From a business process perspective, EC is the application of technology to automate transactions and corporate workflows. From a service perspective, EC is a tool that meets the needs of companies, consumers, and management to reduce service costs while improving product quality and service speed. From an online perspective, EC is the capacity to buy and sell products and information on the internet and other online services (Suyanto, 2003).

E-commerce plays a crucial role, enabling organizations to enter markets easily, affordably, and without geographical limitations, all within cyberspace. In this context, companies compete with other businesses in the virtual world. The use of technology, particularly e-commerce, is expected to benefit the competitive business world significantly. Companies that can compete are those that implement technology within their organizations. E-commerce is the process of buying and selling between two parties within a company, exchanging goods, services, or information via the internet. In implementing e-commerce, several related factors and technologies must be mastered. Thus, there are "three basic categories or types of e-commerce: Business to Consumer (B2C), Business to Business (B2B), and Consumer to Consumer (C2C)." With these three categories, it can be easier for business actors to achieve their intended targets. Thus, "what must be remembered in carrying out e-commerce business activities is: the existence of both electronic sales and purchasing processes, the presence of consumers or companies, and the existence of an online computer network to conduct business transactions."

In the Aligning Business Strategy of Incubator Center and Tenants, tenants are the object of mentoring and performance evaluation. They also manage the entire incubation process to achieve maximum results. Tenants must possess innovative, proactive, risk-taking, entrepreneurial intentions, and a willingness to commercialize, as these variables are interrelated. Tenant participation can be divided into three categories: entry potential, willingness, and graduation enthusiasm. Entry potential will be influenced by entrepreneurial orientation and previous local business indexes. Given the incubation process's approximate duration of 2-4 years, the desire to join must be very high, as tenants must attend many activities. Meanwhile, graduation enthusiasm will encourage tenants to become more expert and independent in their businesses.

Furthermore, the success of a business incubator program is determined not only by the mentoring services provided, but also by the incubator's ability to conduct tenant selection, monitoring, and evaluation. The tenant selection process is a crucial stage because it determines the quality of businesses to be fostered and the suitability of their characteristics to the services provided in the incubator. According to Bergek and Norrman (2008), an effective incubation process requires a robust selection

mechanism, as the success of an incubator depends heavily on its ability to identify and develop companies with high growth potential.

Tenant evaluation is also a crucial component of maintaining an incubation program's effectiveness. Throughout the evaluation process, the incubator can track the progress of tenant businesses, identify any obstacles they face, and provide tailored support strategies to meet each business's needs. Hackett and Dilts (2004) explain that business incubators serve not only as facility providers but also as support systems that assist new companies through learning, networking, and managerial development, helping them survive in a competitive business environment.

Advances in information technology offer significant opportunities to improve the effectiveness of business incubator management. Implementing web-based systems can facilitate more structured and efficient administration, tenant data management, selection processes, and performance evaluations. According to Laudon and Laudon (2020), technology-based information systems can improve decision-making by providing users with accurate, fast, and easily accessible information. With information systems, organizations can reduce manual processes and improve operational effectiveness.

In addition to supporting the incubator's internal processes, the use of digital technology, particularly e-commerce, is also a crucial strategy for tenant business development. E-commerce enables businesses to expand their market reach, increase transaction convenience, and build broader relationships with consumers. According to Turban et al. (2018), e-commerce is a business transaction activity conducted electronically using internet technology, thus providing benefits such as cost efficiency, increased market access, and accelerated business processes.

In the context of university business incubators, implementing digital systems can support the development and coaching of student and tenant businesses. An integrated system can assist incubator managers in monitoring tenant development, managing product information, and continuously evaluating the incubation program's success. This aligns with Mian's (2016) research, which states that university-based business incubators play a strategic role in creating an entrepreneurial environment by providing support services, developing business competencies, and leveraging technology to accelerate the growth of new businesses.

The review of previous research is still presented descriptively, with existing studies mainly summarized rather than compared or critically analyzed. As a result, the research gap and the novelty of the proposed study have not been clearly identified. The author is encouraged to provide a more comprehensive discussion of previous studies, highlighting their limitations, differences, and the specific aspects that distinguish this research from existing work.

Based on this concept, a system is needed that can accommodate the digital tenant selection and evaluation process and support online-based business activities. Therefore, this study proposes the Design and Construction of a Web-Based Business Incubator Selection and Evaluation System for YARSI University. This system is expected to assist the incubator in managing tenant data, selecting tenants, evaluating business development, and supporting online transaction activities using e-commerce technology. The system is built using the PHP programming language, the CodeIgniter framework and MySQL as the database.

2. Methods

2.1. Types of research

The research method has been described systematically and is generally aligned with the development research approach using the Prototype method. The explanation of the research type, data sources, data collection techniques, and research location provides sufficient information regarding the overall research process. The use of primary and secondary data is also appropriately explained to support the development of the proposed web-based business incubator system.

However, the description of the system testing and evaluation stages requires further clarification. The manuscript mentions the use of the UEQ (User Experience Questionnaire) for evaluation, but the

methodology provides insufficient details on how the evaluation was conducted. Important aspects, such as the criteria for selecting respondents, the total number of respondents, respondent characteristics, and the sampling technique used, should be clearly explained.

In addition, the author should provide a stronger justification for selecting the UEQ instrument as the evaluation method. The explanation should clarify the purpose of using UEQ, the aspects of the system being evaluated, and how the obtained results are interpreted to measure the quality or usability of the developed system. A more detailed explanation of these procedures will improve the transparency, reliability, and reproducibility of the research.

2.2. Location and Time of Research

This research was conducted at Yarsi University, located on Jl. Letjend Suprpto, Cemp. Putih, Central Jakarta, from January to July 2020.

2.3. System Design

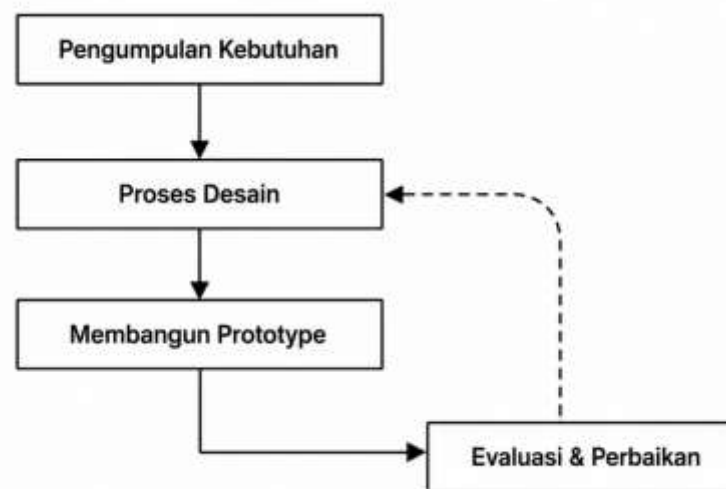


Figure 1. Prototype Model (Purnomo, 2017)

2.4. Requirements Gathering Stage

The explanation of the requirements-gathering stage provides a general overview of the initial stage in the prototype development method. The author explains that the requirements were obtained through interviews and consultations with relevant parties. However, the description of the data collection process remains limited and lacks sufficient methodological details on how the information was collected and analyzed.

The author is advised to provide a more detailed explanation of the data collection techniques, including the type of interview used (structured, semi-structured, or unstructured), the interview process, the main topics or questions discussed, and the reasons for selecting the involved participants. In addition, the role and relevance of the interview subjects, such as their involvement in the business incubator management process, should be clearly explained.

Furthermore, the author should describe whether observation activities were conducted, including the observed objects or processes, such as tenant management activities, selection procedures, evaluation mechanisms, or existing business incubator workflows. The manuscript should also explain how the collected data were analyzed and how they were transformed into system requirements, features, or design specifications. A clearer explanation of this stage will improve transparency in the development process and enable the research methodology to be better understood and replicated.

Table 1. Functional Requirements of the Business Incubator System

Users	Functional Requirements
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<i>User</i>	1	Can view the homepage without having to log in
	2	Can register an account
	3	Can log in as a user
	4	Can manage user accounts
	5	Has a search feature
	6	Can visit the tenant page that sells the product
	7	You can contact the tenant for transactions via the contact listed on the product.
	8	Can register to become a tenant
<i>Tenant</i>	1	Can view the homepage without having to log in
	2	Can register to become a tenant
	3	Can log in as a tenant
	4	Can manage tenant accounts
	5	Can manage the shop
	6	Can manage products
	7	Can send reports to evaluators
	8	Can do periodic quizzes to determine tenant status
<i>Evaluator</i>	9	Can manage tenant accounts
	1	Have access rights to all tenants
	2	Tenant data monitoring
	3	Can view tenant data
	4	Has a tenant rejection feature
	5	Has a feature to accept tenants
	6	Has a feature to disable tenants

2.5. Prototyping Building Stage

2.5.1. Use Case Diagram

Satzinger, Jackson, and Burd (2016) explain that use cases identify the activities users perform on a system and define how the system responds to those activities. With a use case diagram, user needs can be translated into features or services that must be available in the system, thereby reducing errors in the software development process. This use case design has three actors: user, tenant, and evaluator. The following is an illustration of the use case diagram on this website.

Figure 2 shows a use case diagram of the Incubator System. First, we will discuss the user. Before logging in, the user can see the homepage. Then, the user can log in to the website after registering an account. After successfully logging in, the user can select a product on the homepage, search for a desired product/store, manage or edit their account, and register as a tenant.

Tenants no longer register on the homepage because registration is done through the user account. Tenants can perform activities such as uploading, editing, and deleting products. Tenants can also manage or edit their tenant accounts and edit their store profiles. Tenants can create reports on their store developments, such as items sold or stock levels. In addition, tenants can complete quizzes each period to determine whether they are ready to leave the business incubator to run their own business or remain in it.

Evaluator: Evaluators log in using a predetermined account. The evaluator's job is to have access rights to all tenants. Evaluators can accept or reject prospective tenants. They can also deactivate a tenant if they feel the tenant is capable of operating independently without assistance from the incubator, based on the tenant evaluation results.

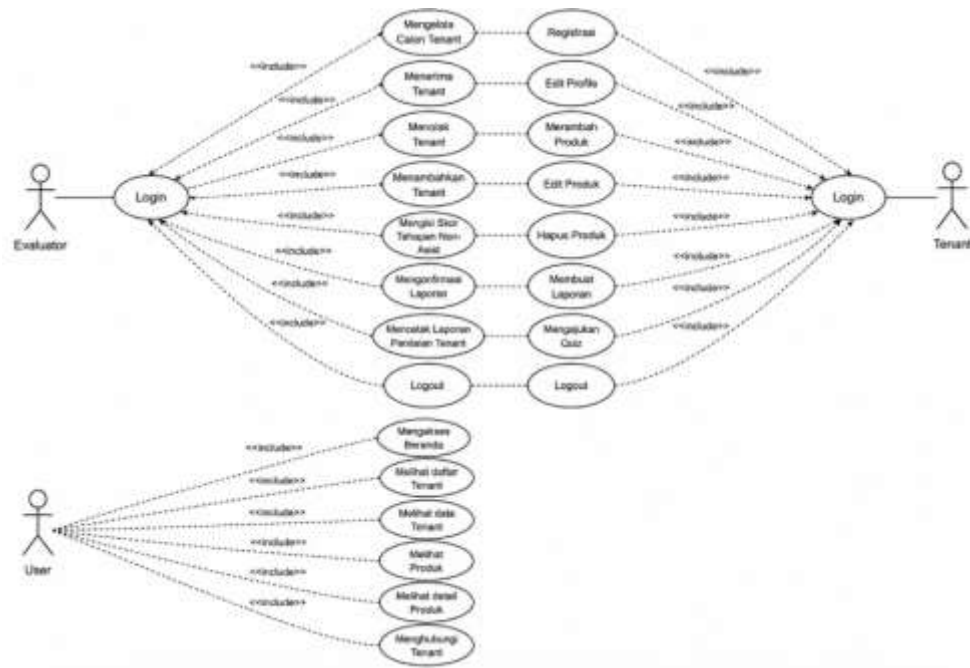


Figure 2. Use Case Diagram of Business Incubator System

2.5.2. Flow Diagram

The flow map connects the roles on this website. The business incubator website flowmap can be seen in Figure 3.

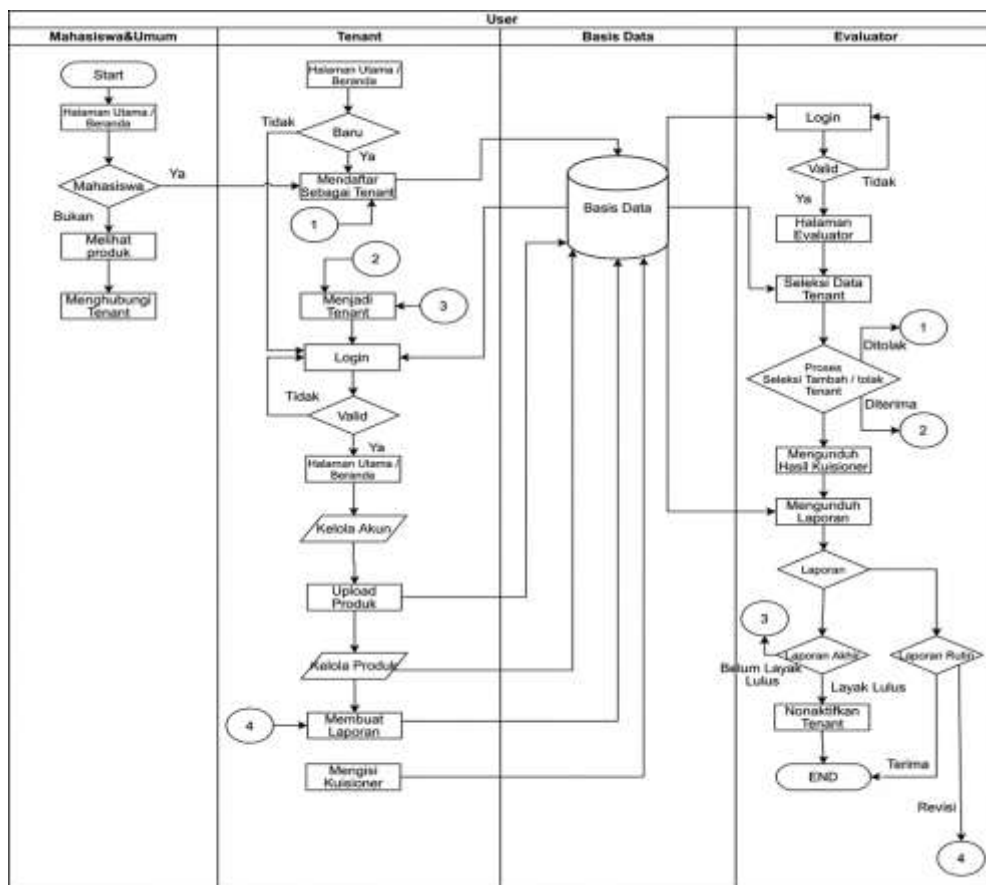


Figure1. Flowmap Diagram of Business Incubator System

2.5.3. Entity Relationship Diagram

The data modeling on the YARSI University business incubator website is illustrated using an ERD (entity relationship diagram). The website contains several entities, some of which can be seen in Figure 4.

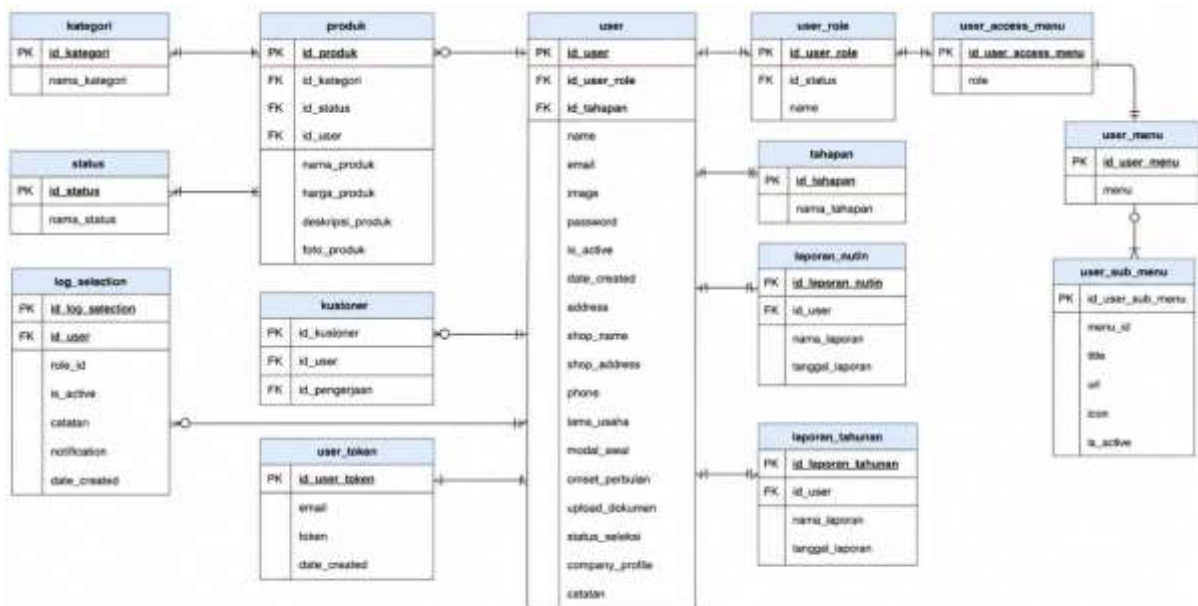


Figure 4. ERD of Business Incubator System

2.6. Prototyping Evaluation Stage

At this stage, evaluations are conducted on aspects such as the database, user interface, and application design. The researchers conducted this evaluation stage to ensure the prototype complies with existing procedures. This evaluation test is intended to determine whether the prototype design complies with existing procedures. This evaluation continues until the design is deemed to meet the system's requirements.

2.7. System Coding Stage

Coding the system at this stage means implementing a system ready for operation. Then there is a process of mentoring and learning for the new or developed system, which can also be done by comparing it with the old system. Evaluations are still made based on the technical and operational aspects of the system and the interactions of system users.

3. Results and Discussion

3.1. System Interface

Figure 5 shows the main page, or homepage, of the business incubator system. When a user opens the system, the main screen displays a list of registered tenants and the products they have stored in the system.

When a user clicks the "visit tenant" button, the system displays the selected tenant's profile. This profile displays a list of the products for sale. The display is as shown in Figure 6. Product details are shown in Figure 7, this display clearly outlines the product's condition and price.

All users, including general users, tenants, and evaluators, are expected to log in to the system to utilize it further. The system login screen is shown in Figure 8 and Figure 9.

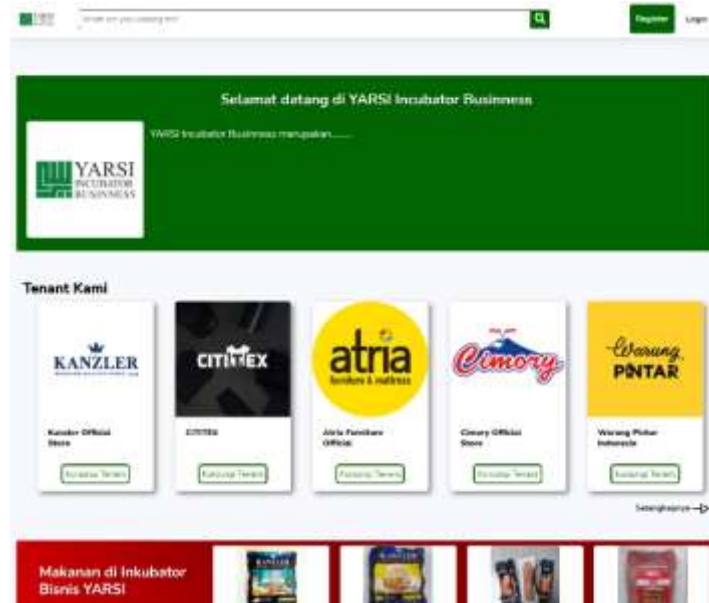


Figure 5. Home View



Figure 6. Tenant Visit View

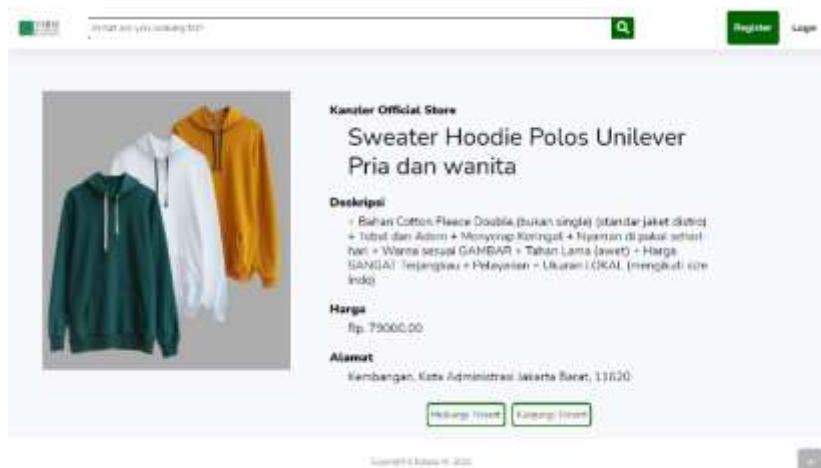


Figure 7. Product Detail View



Figure 8. System Login View



Figure 9. System Registration View

3.2. System Testing

After users run the application, they are instructed to complete the User Experience Question (UEQ). This trial involved 30 users, comprising 46.7% males and 53.3% females, aged 20 to 25 years. Users do not need to write their names on the UEQ. Users complete the questionnaire based on their impressions of the application. After all users had completed the UEQ, the author collected the completed UEQs and entered the UEQ results into the UEQ Data Analysis Tool. The following is the UEQ data filled out by 30 users.

Table 2. Mean UEQ Results

Item	Mean	Variance	Std. Dev.	No.	Left	Right	Scale
1	1.8	0.6	0.7	30	menyusahkan	menyenangkan	Daya tarik
2	1.9	0.5	0.7	30	tak dapat dipahami	dapat dipahami	Kejelasan
3	1.5	0.6	0.8	30	kreaitif	monoton	Kebaruan
4	1.8	0.8	0.9	30	mudah dipelajari	sulit dipelajari	Kejelasan
5	2.0	0.9	1.0	30	bermanfaat	kurang bermanfaat	Stimulasi
6	1.7	1.0	1.0	30	membosankan	mengasyikkan	Stimulasi
7	1.7	0.6	0.8	30	tidak menarik	menarik	Stimulasi
8	0.7	1.1	1.0	30	tak dapat diprediksi	dapat diprediksi	Ketepatan
9	1.6	1.2	1.1	30	cepat	lambat	Efisiensi
10	0.8	2.8	1.7	30	berdaya cipta	konvensional	Kebaruan
11	1.4	1.8	1.4	30	menghalangi	mendukung	Ketepatan
12	2.0	0.6	0.8	30	baik	buruk	Daya tarik
13	1.8	0.8	0.8	30	rumit	sederhana	Kejelasan
14	1.6	0.8	0.9	30	tidak disukai	menggembirakan	Daya tarik
15	0.2	2.3	1.5	30	lazim	terdepan	Kebaruan
16	1.6	0.7	0.9	30	tidak nyaman	nyaman	Daya tarik
17	1.8	0.6	0.7	30	aman	tidak aman	Ketepatan
18	1.8	0.7	0.8	30	memotivasi	tidak memotivasi	Stimulasi
19	1.5	0.6	0.8	30	memenuhi ekspektasi	tidak memenuhi ekspektasi	Ketepatan
20	1.8	0.6	0.8	30	tidak efisien	efisien	Efisiensi
21	1.8	0.5	0.7	30	jelas	membingungkan	Kejelasan
22	1.9	0.7	0.9	30	tidak praktis	praktis	Efisiensi
23	1.7	0.9	0.9	30	terorganisasi	berantakan	Efisiensi
24	1.6	0.9	0.9	30	atraktif	tidak atraktif	Daya tarik
25	1.8	1.2	1.1	30	ramah pengguna	tidak ramah pengguna	Daya tarik
26	1.6	0.7	0.8	30	konservatif	inovatif	Kebaruan

The results of the UEQ (User Experience Questionnaire) evaluation have been presented clearly, and the interpretation of positive and negative evaluation values has been explained in accordance with the established criteria. Presenting the average scores provides an initial overview of the user experience evaluation results for the developed system.

However, the discussion of the evaluation results is still limited to reporting the average values for each item. It does not provide a deeper analysis of the meaning of each UEQ dimension. The author is advised to expand the discussion by explaining how each dimension, such as attractiveness, perspicuity,

efficiency, dependability, stimulation, and novelty, reflects the quality and usability of the developed system.

Furthermore, the author should explain more explicitly the relationship between the UEQ results and the research objectives. For example, if the efficiency dimension obtains a high score, the discussion should clarify how this indicates that the system supports users in completing tasks more effectively. Similarly, other dimensions should be analyzed to explain the system's strengths and potential limitations from the user's perspective.

A more comprehensive interpretation of the UEQ results, supported by comparisons across dimensions or benchmarks (if available), would provide stronger evidence of the effectiveness of the proposed system and strengthen the contribution of the evaluation section.

Table 3. UEQ Scales

UEQ Scales	Mean	Variance
Daya tarik	1.756	0.34
Kejelasan	1.858	0.35
Efisiensi	1.767	0.49
Ketepatan	1.358	0.31
Stimulasi	1.817	0.46
Kebaruan	1.050	0.62

Based on the scale calculation results, the application trial showed positive results. This can be seen in the values on each scale, which are above 0.8, and in the arrows next to the values, which point upward and are colored green (Hinderks et al., 2016).

4. Conclusion

The information system the author developed can help the business incubator monitor tenants and support tenants in promoting their businesses online. The results of the trial of the designed business incubator system are positive. This can be seen in the values for each scale, which are above 0.8, and in the green, upward-facing arrow next to each value. In addition, the practical implications of implementing the system should be more clearly outlined. The conclusion could explain how the system can assist business incubator managers in improving administrative efficiency, monitoring tenant progress, supporting decision-making, and enhancing the effectiveness of incubation programs.

The author is advised to strengthen this section by explaining the research's scientific contribution, particularly how the proposed system advances the development of web-based business incubator management systems. It supports more structured tenant selection and evaluation processes. The author is also encouraged to include recommendations for future research and system development, such as improving system functionality, integrating additional evaluation methods, expanding the system to other business incubator environments, or developing more advanced features to support startup growth. A stronger conclusion that includes contributions, practical implications, and future directions will provide a more comprehensive closing statement for the research.

Recommendation

The system I created certainly has its flaws and weaknesses. Anyone who develops this system adds features I have not included to help all parties involved.

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