

Development of IES (Innovation Entrepreneurship System) Application Mobile for Start-Ups Using Service Science Perspective (Study Case: LPIK ITB)

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Abstract. *Institute of Innovation and Entrepreneurship Development (LPIK) ITB is established as a hub to commercialize the innovation as well as an entrepreneurship development for ITB academic community. Many organizations including LPIK still deny how Industry 4.0 can influence businesses or struggle to find the talent or knowledge how to adopt it. LPIK applies change and prepares a future where intelligent machines improve their business goals. One of them is the existence of mobile applications to create value co-creation. This study using service science perspective to portray LPIK ITB. The methodology used is using a mix methodology. First, quantitative survey is conducted to measure the service quality (SERVQUAL) then qualitative study is conducted by exploratory approach using in-depth interviews and FGDs. Using service science approach, we identify the failed points using blueprints method and design thinking to create for product innovation features. The result of this study is proposed four development programs to improve IES LPIK ITB services, i.e. IES Shop along with the UI/UX features of the standalone service system and as a liaison between the Customers, Mentors, Industries, Investors, and Employees at LPIK involved (Proposed Prototype), Design Service Blueprint (Customer Oriented), Integrated People Development Program, and Digital Experience Development Program.*

Keywords: *LPIK ITB, servqual, service science, mobile application, and service design.*

1. Introduction

Institut Teknologi Bandung (ITB) is a university which have three pillars of higher education in advancing science, technology, art as well as social and humanities. To make the Indonesian community's hopes as well as all ITB civitas academic, the spirit of working together must be encouraged and enhanced. ITB as an Entrepreneurial University, according to the Chancellor's decision number 104/SK/K01/OT/2010 have aims to encourage the innovation commercialization from the inventors and entrepreneurship activities from the students. Entrepreneurial University (EU) is university which has attempts to innovate in how to run a business, create shift of substantial organizational characters. In a modern era, universities should become the centre of

economic knowledge, entrepreneurship oriented universities are perceived as the central power that promotes innovation, creativity, and economic growth (Audretsch, Keilbach, & Lehmann, 2006).

Institute of Innovation and Entrepreneurship Development, Institut Teknologi Bandung (LPIK-ITB) established to develop full programs of entrepreneurial activities that will build a culture of innovation and entrepreneurship development. One of the program supported by LPIK is business incubation to help many start-ups how to grow their business. However, many of start-ups feel the income and selling experience of their business is less than optimal. Then they felt that most of the activities carried out by LPIK were incidental.

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There is a regular schedule when new companies have joined the funding program. Talk shows from LPIK also tend to be sudden. They also want LPIK to collaborate with outside incubators. Maybe with a number of non-campus incubators so that they can do joint mentoring or just sharing sessions at LPIK.

ICT and the internet have actually been utilized by LPIK on its official website as well (Novani, Suryana, Putro, & Supangkat, 2017). But the information displayed is very limited and the communication carried out tends to be passive and not in real-time. In fact, there are still many who do not know what LPIK is because this official website has not been integrated with other internal ITB optimally. So that some stakeholders have not been able to feel the benefits of LPIK, like Entrepreneurship Development, Co-working space, Industrial and Business Incubators, Law and Intellectual Property, and Techno Park. In accordance with the service science approach, to achieve a better customer experience is by creating value together (value co-creation). Value co-creation is the process of how customers and service providers interact and create value co-creation through the formation of various sources (Kijima & Arai, 2016). In customer activities during the value co-creation process, it is very possible for providers to tailor their services to their customer's needs. So this process will produce a value proposition for customers and providers.

Based on the problems faced by LPIK, this research is expected to be able to identify and propose a mobile application-based platform dedicated to LPIK activities to be better in terms of cost, time, or effort that needs to be spent.

The purpose of this study are:

- a. To identify the gap between the desire of start-ups and programs offered by LPIK as an ITB innovation and entrepreneurship development institute.
- b. To propose alternative solutions for the ineffectiveness of services at LPIK by

propose a mobile application-based platform to be better in terms of cost, time, or effort that needs to be spent.

2. Literature Review/ Hypotheses Development

This part will discuss the concept of information communication technology (ICT) utilization and perception, service science and Design Thinking based co-creation.

Information and Communication Technology (ICT) Utilization

The world has become connected through information communication technology (ICT). Nowadays ICT is utilized as an enabler to accelerate knowledge transfer and enhance the productivity in many sectors both of developed and developing country.

Indonesia as a developing country utilize the ICT for better development. There are many things that Indonesia is able to explore in dealing with industry 4.0 by utilizing the ICT. For example, empowering micro, small, and medium enterprises (MSMEs) through technology with e-commerce platform facilities, then advancing high-speed internet networks, cloud data centers, security management, and broadband infrastructure to support the development of national digital infrastructure.

According to Ramadhani (2003), the internet is a designation for a collection of networks in hardware that can connect various academic, government, commercial, organizational, to individual sites. So that the merger of ICT and the internet is a solution and can provide many benefits to the community to make the work easier, more effective, and efficient in developing innovation. ICT and the internet is a solution and can provide many benefits to the community to make the work easier, more effective, and efficient in developing innovation.

Service Science

Service science is a value co-creation process to identify how customers and service providers interact and create value co-creation through the formation of various sources. In customer activities during the value co-creation process, it is very possible for providers to tailor their services to their customer's needs. So this process will produce a value proposition for customers and providers.

This study using service science perspective in creating platform designs to be able to build value through collaborative interactions with each other (Vargo & Lusch, 2016). Foundation of service science is service dominant (S-D) logic as a framework to understand the service concept (Vargo & Lusch, 2016). S-D Logic has captured in eleven foundational premises (FPs), which define service is an application of skills, competences and performances to create benefit.

Design Thinking Based Co-Creation

Design thinking is being used to address a diverse problem (Altman, Huang, & Breland, 2018; Brown, 2008). It focused on human centred design to provide the solution for

fulfilling the human needs. This study using design thinking based co-creations (Elg, Engström, Witell, & Poksinska, 2012; Mummah, King, Gardner, & Sutton, 2016) by creating a creative collaboration between diverse users to define, clarify, create and realise the goals to provide a value by creating platform to support LPIK.

When creating a user interface (UI) or user experience (UX) design, it needs a different solution and design the interface based on the existing service design (Andreassen, et.al., 2016). Service blueprint is a tool to help the provider understand how the customers experiences the business's service process. Meanwhile, UX is a human first approach to product design and UI is a human first approach to designing the aesthetic experience of a product .

3. Methodology

The proposed conceptual framework is based on the four phase model of value co-creation and adjusted to fulfil the need and expectation of both parties, i.e., start-ups and LPIK ITB.

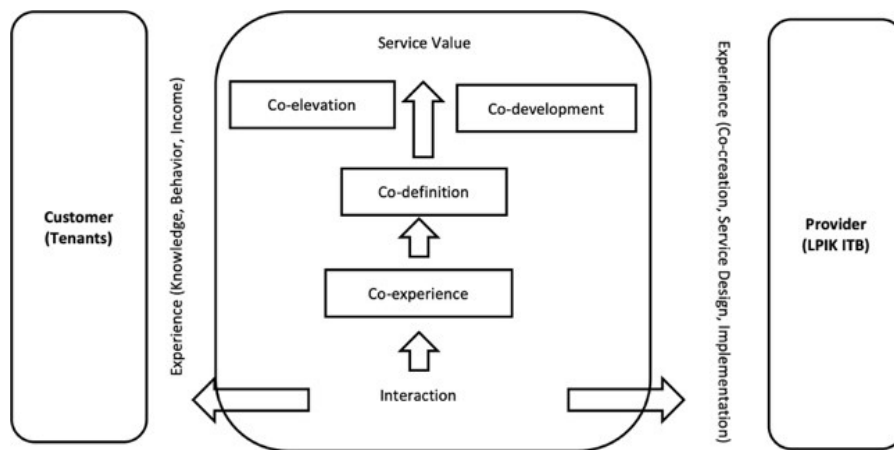


Figure 1. Conceptual Framework about the Process Value Co-Creation Model

Based on the exploratory studies (in-depth interviews) is parallelly conducted, it was found that the value co-creation within LPIK

ITB was less than optimal because there was not much customer involvement (start-ups) as service users and collaboration between LPIK

ITB providers. Start-ups, need more knowledge, strategies, tips, and tricks to market their services to customers since they only get knowledge in terms of planning, funding, and product development alone. They feel the income and selling experience of their business is less than optimal.

They also felt that most of the activities carried out by LPIK were incidental. Start-ups' expectation is to collaborate with outside incubators so that they can conduct joint mentoring or just share sessions at LPIK ITB. Through the study, we explore the problems or potential problems further and propose the alternative solutions to enhance the customers experience and needs. By using the proposed conceptual framework, the perceived value start-ups is very dependent on how well the service design and operational implementation provided by LPIK ITB.

Value co-creation is used as a process of social interaction or collaboration between stakeholders to capture how customer experience and expectations by using customer surveys to get a description of

knowledge, behavior, and income business from their buyers.

Meanwhile, service provider also prepares co-creation, service design, and implementation. Of course, the two interactions between the customer and the provider must be supported and promoted by platform using ICT, i.e., Mobile Application (Kijima & Arai, 2016; Kijima, Rimtaki, & Mitronen, 2014; Novani & Kijima, 2012).

Data Collection Methods

In this study, the authors using a mixed-methodology. By using triangulation, we use different methods of data collection. First, to obtain a primary data, we use qualitative method by conducting interviews with related units and stakeholders. Second, we use quantitative method to conduct customer satisfaction surveys (start-ups) at LPIK ITB, by using ServQual (Service Quality) analysis. Meanwhile, to obtain secondary data from a literature study on several academic journal data sources. Figure below is the research design to conduct this study.

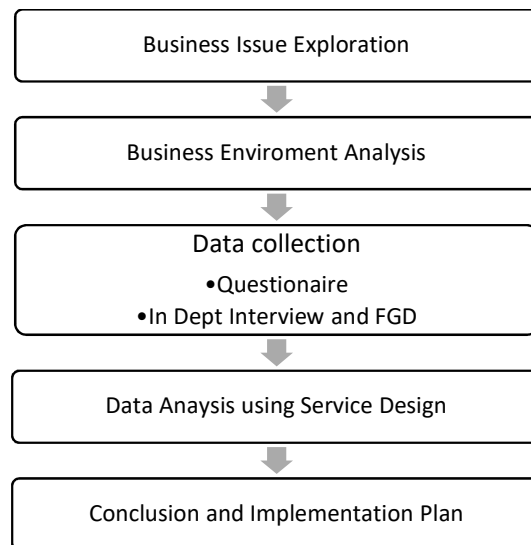


Figure 2.
Research Design

Population and Sample

The population in this study are start-ups who joint LPIK ITB. We use data from 2015 to 2019 to get the number of samples needed for

survey research. The population of start-ups at LPIK ITB was 136. To calculate the sample size of the population of start-ups, we use simple random sampling method. To get the number of sample size, we use the Slovin

Formula with the level of significance is 10% or confidence level (90% or 1.645) as follows

$$n = \frac{N}{1 + N(e)^2}$$

Figure 3.

Slovin's Formula Sampling Techniques

n: Sample Size

N: From LPIK data, the proportion of LPIK start-ups (2015 - 2019) is 136 start-ups.

e: Margin of Error (10%)

Based on the calculation above by using the Slovin Formula, we got a total of sample size is 57 respondents. But in this study, our sample numbers are 60 respondents.

Questionnaire Design

By using SERVQUAL instrument, we design a questionnaire to find the gap between the expectation and perceptions of start-ups at LPIK ITB by using likert scale from 1 until 4. In the questionnaire, it consists of 6 parts, namely part 1 describes the demographic, part 2 describes the experiences of start-ups in PIK ITB, part 3 describes the experience of start-ups using website platform at LPIK (Innovation Entrepreneurship System/IES), part 4 describe the expectations of start-ups who use mobile applications, part 5 describes overall satisfaction with service quality using website platform at LPIK (IES). The last in part 6, is the additional comments section,

where respondents can provide comments and concerns about things that need to be improved based on their assessment. This commentary blank space also functions as another input source that might be related to LPIK ITB digital services through a mobile application.

Interview Guideline

The author will get an overview of the actual conditions in order to find the solutions to overcome LPIK ITB service problems.

The interviewees List in this study are:

- 1) AVP of LPIK Service Strategy: Providing the direction for strategic planning and policymaking for LPIK service facilities for the LPIK IES website.
- 2) SM of LPIK Service & Facility Policy: Providing the information on the daily operation of the IES LPIK website.
- 3) Programmer and Coordinator of digital LPIK (IES LPIK): Providing the detailed implementation of services and transformation of the IES LPIK website.
- 4) Field Officer: Providing services for LPIK start-ups, especially in the incubator section.

Data Analysis Method

This study, the authors used a mixture of quantitative and qualitative research methods. Here are some tools that will be used by the author for analysis needs, as follows:

Table 1.

Tools of Analysis

To	Subject	Analysis	Process
1	Internal Environment	<ul style="list-style-type: none"> • Service Blueprint • In-Depth Interview • Forum Group Discussion 	<ul style="list-style-type: none"> • Fail Point Identification • Qualitative Data Analysis
2	Service Delivery	Service Quality Survey	Using SPSS for: <ol style="list-style-type: none"> a. Reliability & Validity Test b. Descriptive Statistic
3	Problem Cause Identification	Root Cause	<ul style="list-style-type: none"> • Ishikawa Diagram • Five Whys

To find out how big a quantitative service gap is needed, that is by using a Service Quality Survey. The collected data will be analyzed first to test the validity and reliability using a statistical software program, namely SPSS Statistics. Then to find the root of the problem that occurs in LPIK ITB digital services, the authors use qualitative methods, namely Root Cause Analysis (RCA) using Ishikawa Diagrams (Fishbone) and 5 why methods, the authors identify the causes of problems in LPIK ITB digital service.

4. Findings and Discussion

IES (Innovation Entrepreneurship System) Service Blueprint Analysis

From the results of the group discussion forums and in depth interviews, it can be drawn a blueprint of LPIK ITB services, especially in the area of innovation and entrepreneurship and **there are 4 points** of failure that can cause LPIK services to become poor or ineffective and inefficient, namely:

Table 2.

Fail Point of Current LPIK ITB Service Blueprint

No	Fail Point	Service Blueprint Analysis
1	Feature of UI/UX	<p>The features in the UI/UX are not complete and only provide tenant registration, IPR registration, and innovation proposal registration. Only to facilitate and speed up administration of LPIK programs so that there is no need to queue at the LPIK office. The UI/UX of current LPIK ITB services had an unattractive UI/UX and too many menus & steps.</p> <p>Start-ups complained that when they wanted to log in to the IES website an error occurred.</p> <p>Start-ups feel they lack the knowledge and experience to market their products/services because LPIK does not provide knowledge of tips & tricks in marketing products/services and LPIK does not have a place for buying and selling of creations & ideas from products/services of start-ups who are ready to be offered to buyers.</p> <p>LPIK does not have a place for investors to contact directly with their start-ups through LPIK. So whoever the investor is, for the amount of funds can be filled in tenant business activities for business development with the guidance of LPIK mentors.</p>
2	Process/ System	<p>Information through events & agendas and news that are not updated in real time.</p> <p>There are deficiencies in the registration process.</p> <p>There must be Real-time mentoring with the appointment schedule, any date that is still empty or full, and also there is no manual processing of log book mentoring anymore.</p> <p>Application testing and deployment are still manual, not using automated testing and DevOps.</p> <p>LPIK systems are still in improper use (Functional but object-oriented implementation) and functional programming. But the implementation uses objects and classes, not functions so they don't fit. This is because it uses the old CodeIgniter framework. The schema and database system already existed in the previous program, although there is no need for re-analysis but it is also difficult to make changes. Some codebases are too rigid.</p>

Table 2. (Continued)
Fail Point of Current LPIK ITB Service Blueprint

No	Fail Point	Service Blueprint Analysis
3	Database & Validation	Providers provide a platform for ease of performance (LPIK), but their system is not integrated with the needs and desires of start-ups, consequently there are often failures in their business processes.

Interview Result & Analysis

In conducting in-depth interviews and FGD conducted by the author. The purpose of this interview is to confirm and obtain detailed information about the problems that occur and the desired expectations for improving LPIK ITB services. The key people chosen are senior or middle leaders who have

responsibility in LPIK service management in the areas of innovation and entrepreneurship, incubators, LPIK ITB offices, and externals such as alumni and start-ups who are still running, LPIK website programmers, and a former LPIK mentor. The interview was conducted from 5 May to 28 June 2020 with an average duration of about 30 minutes.

Table 3.
Interview Research about LPIK ITB (source: in-depth interview)

No.	Subject	Statement
1	Responsibility	<p>There are still several roles that have not been clear "grey area", it has the potential to become a bottleneck in business processes. The problem is :</p> <ul style="list-style-type: none"> • When they want to upload something they often fail to upload, and are less user-friendly because there are too many choices on the menu. • When start-ups will register for the start-up Grant program, they must re-register manually in the IES system and fill in the registration data that actually existed during tenant registration, so that data duplication can occur. Ideally, start-ups no longer need to fill in the Startup Grants program form with data that was filled out during initial tenant registration. • There are still start-ups who feel the information related to the agenda and events of LPIK is done suddenly.
2	Technology	<ul style="list-style-type: none"> • The technology used is still conventional, although some systems are digital-based there are still business processes that are run in a conventional way: Use of website technology for start-ups only when logging in, when registering tenant profile data and registering the LPIK program, the rest for other business processes is done manually. • The LPIK system was still in improper use (Functional but object-oriented implementation). • Database schemes and systems already exist in previous programs and some code bases are too rigid so it is difficult to make changes. • There is no versioning history of changes in transaction data because it is still an ordinary CRUD (Create, Read, Update, and Delete), so it is very critical if there is a change in data and wants to return to the previous version.

Table 3. (Continued)
Interview Research about LPIK ITB (source: in-depth interview)

3	Service Design	<ul style="list-style-type: none"> • In the implementation of LPIK ITB services, there is currently no service design or service blueprint available.
4	Facility	<ul style="list-style-type: none"> • The current condition of the facilities at LPIK ITB is still not optimal, some facilities require rearrangement. As the start-ups need a qualified room for meetings and business activities because the comfort and spacious co-working space is too small. • Working hours, especially for the co-working space/LPIK ITB start-ups, they propose to be longer than 17.00 hours and on Saturdays can still be accessed. So that when Mentoring activities do not need to be done outside the LPIK area. • Scheduling notifications for the agenda, events and mentoring from LPIK for start-ups must be improved. • The start-ups feel they do not have enough experience and knowledge in marketing their products to the public.
5	Customer Focused (Oriented)	<ul style="list-style-type: none"> • No service designs • Operation Oriented
6	Continuous Development and Improvement	<ul style="list-style-type: none"> • Customer-focused (customer wants & needs) oriented. • Integration System • Implement new technologies that can provide developments, through IES mobile applications for start-ups. • Ecosystem Collaboration between start-ups, inventors, industry, and buyers to support local products from start-ups. So it will be faster and easier with the protection of LPIK ITB.

Validity Test

In this study, the terms valid indicator $r_{test} > r_{table}$. With a sample size of 60 and a 90% confidence level, the r_{table} is 0.211. The

author compares the correlation value of the total items corrected by 0.211, all of which are valid for both for customers' expectations and perceptions.

Table 4.
Reliability Test for Customer Expectations

Reliability Statistics on Expectation Customers		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.890	0.873	20

Show that Cronbach's Alpha for Expectation Customer is 0.890. Therefore $R_i = 0.9 > 0.890$ ≥ 0.8 so the questionnaire is reliable with the internal consistency is good.

Reliability Test

Following the result of reliability result through SPSS, show that all of data (60 data) have processed and there is no missing data.

Table 5.
Reliability Test for Customer Perceptions

Reliability Statistics on Perception Customers		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.951	0.952	20
Show that Cronbach's Alpha for Perceptions Customer is 0.951. Therefore $R_i = 0.951 \geq 0.9$		so the questionnaire is reliable with the internal consistency is excellent.
Servqual is known as the gap analysis model which is closely related to the customer satisfaction model based on the design of disconfirmation (customer perceptions) which increases greater than the expectations		(customer expectations) of the attributes concerned, then the perception of service quality will be positive or negative (Tjiptono & Chandra, 2011).

Table 6.
The Ranking Gap Score Statement
(Source: Zeithaml, Parasuraman, & Malhotra, 2002)

No	Rank Dimensions	Statements	Code	Gap
1	Assurance	In providing services must always be friendly and polite.	Asc_3	-0.78
		Provider must have good skills and abilities in serving start-ups	Asc_1	-0.57
2	Tangible	The condition of the facilities and IES application in LPIK (innovation and entrepreneurship) must always be in good condition, clean and safe for comfort.	Tan_2	-0.6
		LPIK ITB building conditions including the completeness of equipment and facilities used in providing services must always be in good condition, clean, and safe in comfort.	Tan_1	-0.56
3	Empathy	Provider must provide a convenient and reliable service for start-ups.	Emp_4	-0.6
		Service users (start-ups) must be easy to understand/easy to obtain information about innovation and entrepreneurship for their business.	Emp_1	-0.56
4	Responsiveness	Provider must be willing to be ready, good, fast, and appropriate in responding to complaints/problems from start-ups.	Res_2	-0.51
		Information on LPIK ITB services (innovation and entrepreneurship) that should be provided must to pay attention to any issues from start-ups.	Res_1	-0.47
5	Reliability	Provider must ensure/have the ability/experience/knowledge to meet the needs of start-ups.	Rel_2	-0.55
		The mentoring service/event agenda that is informed in the LPIK building or LPIK IES application must be appropriate, not sudden, and on time.	Rel_4	-0.5

Root Cause Analysis

In conducting Root Cause Analysis, the writer uses the Fish Bone Analysis method. Fishbone Diagrams are also known as

Ishikawa Diagrams. In this study, the writer will label bone categories with 4 P's (People, Plant, Procedure, Policies).

Table 7.

Root Cause Analysis of LPIK ITB

No	Factors	Causes	Root Causes	CF / UCF	Responsibility
1.	People	Lack of Awareness In Skill & Motivation	Staffs & Mentors have different Skills and Motivations due to lack of training, experience, and motivation systems.	CF	LPIK Stakeholders
			Staffs & Mentors also have a delay in the action of any activity because for them, this is not a dedicated job focus at LPIK ITB.	CF	LPIK Stakeholders
2.	Plant/ Technology	Lack of Technology & Design UI/UX	Imperfect Risk Analysis & Emergency Management	CF	Head Office
			It still in improper use (Functional but object oriented implementation) and is difficult to modify to handle major business process changes and no Entity Relationship (ER) Database design for the current site, the IES website.	CF	Head Office
			No Integration System, Incompleteness Features, and Inefficient Room Layout Capacity.	CF	Head Office & related LPIK Stakeholders
3.	Procedure	No SOP Experience for Start-ups	The SOP procedures made by LPIK providers are not customer-oriented because they don't know what LPIK start-up tenant needs. Tenant Start-up also wants to have the experience to be able to market their products/services to the wider community.	CF	Head Office & related LPIK Stakeholders
			Then the existing LPIK procedure is not user friendly because the process is very complex (focus on the website).	CF	Head Office & related LPIK Stakeholders
4.	Policies	No Integration Policies	Conflicts of interest among stakeholders arise because there are no stakeholder regulations, especially when arranging funding related to the administration of the ITB campus.	UCF	ITB campus Stakeholders
			Low ITB campus Stakeholders Engagement because they do not listen to the customer's voice.	UCF	ITB campus Stakeholders

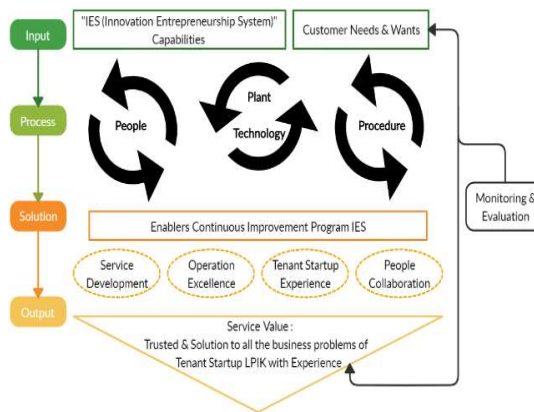


Figure 5.
LPIK ITB's Business Solution Framework

From the root cause analysis above, the potential factors that contribute to the low satisfaction of LPIK ITB's start-ups is come from People, Plant, and Procedure.

The fundamental challenges faced from root cause analysis are how to create good business procedures, SOPs to create a better experience for start-ups, and encourage collaboration in system integration. This study will focus on controllable factor (CF) from the factor categories.

To solve the problem in this study, we combine the findings of the analysis on the business environment (provider and customer needs analysis), service performance analysis, and root cause analysis to propose developments in business processes to improve service quality. This improvement is expected to have an impact to enhance the experience and satisfaction of start-ups at LPIK ITB as follows.

- a. Input
By using value co-creation concept, it is necessary to obtain information about service at LPIK was provided, especially the utilization of IES currently.
- b. Process
In improving services, the process stages and performance at LPIK ITB that has been running need to be monitored and evaluated.

- c. Solution
To determine the LPIK services, we analysed a service business process. By proposing the alternative solutions, it needs a Continuous Improvement Program of IES (Novani, et.al., 2017), which will be discussed in more detail.
- d. Output
The expected output after the improvement program initiative is to improve the ability of LPIK as an institutions to provide service as well as develop the ability of LPIK in the digital field (IES application mobile). The output is to increase customer satisfaction and to achieve the business processes more better.
- e. Monitoring & Evaluation
Efforts to improve sustainable services need to be applied to monitoring and evaluation methods in LPIK on the mobile application of IES (innovation entrepreneurship system). The success in achieving goals is half determined by a predetermined plan and half the function of supervision or monitoring (Conor, 1974).

Table 8.
Proposed Business Solution Alternatives for the LPIK ITB Service

Enabler	Problem Statements	Proposed Programs
Service Development	<ul style="list-style-type: none"> • The current application (IES Website) for start-ups is only for registration. The system is not integrated with the activities, learning, and experience of LPIK services for start-ups • Feature of application are not complete. Almost all activities are carried out manually. Less effective and efficient • There is no data sharing about how the performance of the other start-ups to be more motivated • Incompleteness Features and as a liaison between Customers, Mentors, Industries, Investors, and Employees in the LPIK involved. 	IES Shop Mobile Application, Features UI/UX, and self-service system for the LPIK IES Shop service mobile application
Operation Excellence Process	<ul style="list-style-type: none"> • No Service Blueprint/Service Design • On Time Performance problem • Information system is not update • Still in improper use (Functional but object-oriented implementation) and is difficult to modify to handle major business process changes and no Entity Relationship (ER) Database design for the current site, the IES website. • Not user friendly for the website, too many choices on the menu 	Design Service Blueprint/Service Design
Start-ups	<ul style="list-style-type: none"> • Cannot monitor all activities to be held at LPIK and in its own start-ups (mentoring schedule) at real time • Start-ups lacks experience in Marketing its products/services • To do a mentoring agreement with his/her mentor and other activities is still done in the conventional method • Ecosystem Collaboration to support local products from start-ups. So it will be faster and easier with the protection of LPIK ITB. 	Digital Experience Development Program
People Collaboration	<ul style="list-style-type: none"> • Not Customer-focused (customer wants & needs) oriented. • Delays in Action • Different Skill and Motivation 	Integrated People Development Program

Design Thinking

In the design of user experience (UX), it is important to develop and refine skills to understand and cope with rapid changes in user environment and behaviour. Design Thinking was introduced by (Rowe & Kahn, 1987). Therefore, the author can do better UI/UX research and use prototypes to uncover new ways to meet the needs of users (start-ups).

Empathize

- Start-ups feel disappointed with the features in the UI/UX are not complete for start-ups (only provide start-up registration, IPR registration, and innovation proposal registration)
- Start-ups feel that the one on the IES website currently has a UI/UX that is not attractive and too many menus & steps for them.
- Start-ups find it difficult to arrange a schedule to follow the activities in LPIK and mentoring

- activities because they are often delayed/done suddenly
- The operational time of LPIK should be longer than work hours and open at weekend as well.
- Start-ups are annoyed if they want to enter the IES website, because there are often errors.
- Start-ups feel sad, because they do not have the knowledge and experience to market their products/services. Even though the products/services they make are ready to be marketed and introduced to the wider community.
- From the results of the start-ups' statement, LPIK mentors do not provide knowledge about tips & tricks in marketing products/services from mentoring & LPIK activities
- From the results of a survey conducted by researchers, income from Start-up businesses is 33% at most under 1 million/month
- LPIK does not have a strategic place for Start-ups to sell creations & ideas from their products/services
- Start-ups feel that LPIK does not have a good place for investors and industries who want to work together to be able to contact directly & can be facilitated by supervision from LPIK
- Start-ups feel that information through scheduling events, agendas, and news often happens suddenly or delayed.
- From the LPIK programmer's statement, testing and application deployment is still done manually, not using automated testing and DevOps. The current IES website is functional but object oriented
- The LPIK programmer also said that the database scheme and system already existed, but that it was difficult to make changes/modifications again. Some codebases are too rigid.
- Start-ups also feel they need a space that meets the requirements for their meetings and business activities, because the convenience and co-working space at LPIK is too small.
- The UI/UX requirements on the IES website must also be kept simple and specifically need to be aimed at the needs of novice start-ups
- Need to have facilities that can support start-ups to conduct mentoring activities safely and comfortably because they are often done outside the LPIK area
- Need to make the application more interactive, easy to use, does not consume a lot of memory, and can be integrated with investors, industry, and buyers directly to start-ups with the supervision of LPIK
- There is a need for facilities that can share knowledge, experience, and tips & tricks in marketing products/services from mentoring & LPIK activities
- Need to make a strategic and flexible place to buy and sell creations & ideas from start-ups' products/services
- Need a place to be able to inform upcoming events, agendas and news on LPIK in real time.

Ideate

Define

- Develop UI/UX features to assist tenant activities at LPIK, such as My Mentor, My Store, My Buyer, My Agenda, My Business Performance, and the Help Centre. In addition, it can be linked to customers, mentors, industries, investors, and other tenant information for users of these features.
 - Provide feedback features such as star rating, messages, impressions, and features for taking pictures to LPIK mentors. So that the LPIK mentor will indirectly provide the best service in accordance with the needs and desires of start-ups.
 - Creating a new IES mobile application with UI/UX conditions made simpler, more interactive, easy to use, does not use much memory, and this application is intended for the needs of start-ups. Then in addition, it can be integrated with mentors, investors, industry, and buyers directly to start-ups with the supervision of LPIK
 - Information through events, agendas, and news, there must be with a push notification
- Required to complete UI/UX features to help the series of activities of start-ups.

Prototype

IES Shop: Mobile Application along with UI/UX features and self-service system for

the LPIK ITB as a liaison between Customers, Mentors, Industries, Investors, and Employees in the LPIK involved.

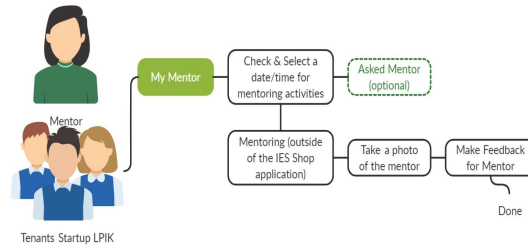


Figure 6. Sitemap Mentor & Start-ups for IES Shop Application Mobile

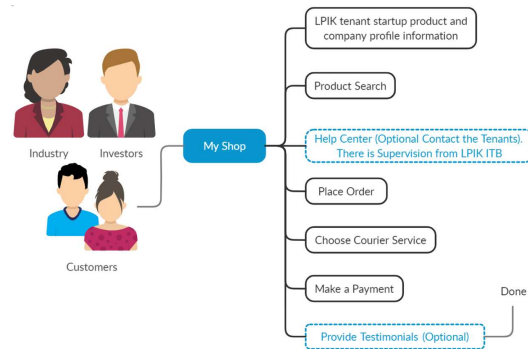


Figure 7. Sitemap Industry/Investors/Customers for IES Shop Application Mobile

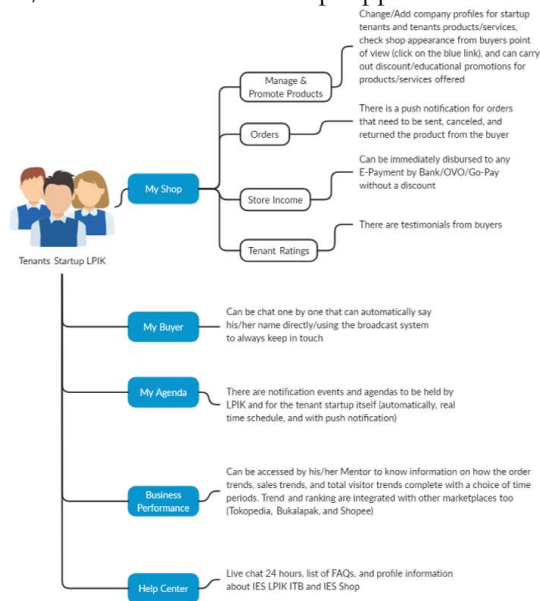


Figure 8. Sitemap Start-ups for IES Shop Application Mobile

Operation Process

Service Design/Service Blueprint

In the design of new services, the authors propose a concept that is supported by the ease of technology services through mobile

applications (IES Shop) with the concept customer-centric oriented.

Customer (Start-ups) Digital Experience Development Program



Figure 9.

Development Digital Experience Program at IES LPIK ITB

- Mobile Support, which provides support services on tablet or smartphone platforms according to customer needs.
- Opinion Gathering Tools Support, providers must be able to measure how customers feel about product or service experiences, so they can find opportunities for improvement.
- Visual Consistency, by creating different visual and functional patterns between menu choices can allow people to easily migrate between them and make them loyal to the LPIK service.
- Live Chat, always connected with LPIK start-ups, and their customers through live chat communication media, and the willingness to accommodate their needs.
- Paid Media Support, for the function of the My Shop menu, which is the process of educating, selling, and buying products/services for LPIK tenant businesses with buyers requiring good transaction media
- Self Service, by providing self-service, start-ups and their buyer can save time and energy.
- Social Support, the availability of social media (Instagram, Facebook, WhatsApp) for communication media or customer service.
- Omnichannel Support, integrated service system availability. By centralizing all communication, streamlining the customer's digital experience, and over time can build loyalty.

Integrated People Development Program

LPIK ITB's employees who have motivation and skills will have far more productivity and will ultimately have a positive impact on overall company performance. To find out how to motivate team members, one must take several approaches such as:

- Build Relationships with Team Members
- Treat Them Well and Plan Time For Gathering and Refreshing Together
- Set High Goals, but Can Be Achieved
- Build Trust between Superiors and Employees
- Make a Contest with Fair Prizes

We need to encourage employees to learn and develop by improving other skills effectively. For example, to improve skills by inviting them to join in meetings or other interesting

activities organized by other companies/institutions. Moments like that will be an interesting experience for them, because they feel directly involved when working in the office. It can also be done by honing public speaking, leadership, or others by attending training, workshops, or non-formal education provided by several credible outside institutions.

5. Conclusion

Based on the vision and mission of LPIK ITB, the results of in-depth interviews, and FGD with providers included in the LPIK, they have a commitment to improving and developing LPIK ITB IES services through a service science perspective. By involving customers (start-ups) and stakeholders, applying the latest technology and innovating to provide new experience in supporting the series of start-ups' activities at LPIK ITB.

The existing IES is a platform developed by the LPIK ITB Entrepreneurship Sector Secretariat team to enable co-creation between stakeholders, so in this case there has been built with the concept of integration, which is a digital facility.

Through the provision of digital facilities in the LPIK ITB, namely the current IES website-based service, stakeholders can collaborate and strive to provide facilities for LPIK ITB providers in managing administrative and registration activities of start-ups.

From the results of the in-depth, the current implementation of IES LPIK ITB service is still not optimal and there are still some obstacles, especially the start-ups who feel the most. The performance and quality of LPIK service still have a gaps. Based on the service science perspective, the we analyze it from the perspective of LPIK as a providers and start-ups as customers.

As well as finding out what the root causes of the problem are to identify problems, gaps in

service quality and the needs of start-ups to get satisfaction.

To answer the research question number 1, that is identifying the gap between the desire of start-ups and programs offered by LPIK as an ITB, this following:

1. In Service Blueprint, based on the results on the current condition at LPIK ITB's, we found 4 points of failure that can be controlled. An alternative solution needed is to redesign the existing service blueprint.
2. In qualitative data Analysis, from the results of in-depth interviews and FGDs, there are 6 main points based on interview questions to explore the perspective of the interviewee, including Responsibility, Technology, Service Design, Facility, Customer Focused Oriented, and Continuous Improvement. Overall, it can be concluded that the LPIK ITB service still need a lot of improvement to make customer satisfaction standards (start-ups).
3. In Servqual Customer Survey, it can be concluded that with a negative gaps in all dimensions of LPIK ITB service quality, it means that customer expectations (start-ups) are higher than the perception of LPIK ITB service performance. The highest gap is the assurance dimension (-0.3475), the difference is very little with the second rank, namely the tangible dimension (-0.3450), and the lowest is reliability (-0.2700). Given the results of the analysis of the start-ups, it can be explained that the LPIK ITB service has not been customer-oriented.
4. From the Root Cause Analysis, potential factors that can be controlled and contribute to the performance of LPIK ITB service are People, Plant/Technology, and Procedure. After the analysis process is completed, the start-ups is not satisfied (low satisfaction from start-ups) because LPIK ITB cannot fulfil their needs. So there must be a continuous improvement in the aspects of People, Plant/Technology, and Procedure that is customer oriented (start-ups) and easy to implement.

Then to answer the research question number 2, we propose alternative solutions for the ineffectiveness of services at LPIK will focus on:

- a) Mobile Application (IES Shop) along with UI/UX features and self-service systems for the LPIK ITB as a customer between Customers, Mentors, Industries, Investors, and Employees in the LPIK involved. (Proposed Prototype);
- b) Blueprint Service Design/Service Design (Customer-Oriented);
- c) Digital Experience Development Program;
- d) Integrated People Development Program.

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Appendix

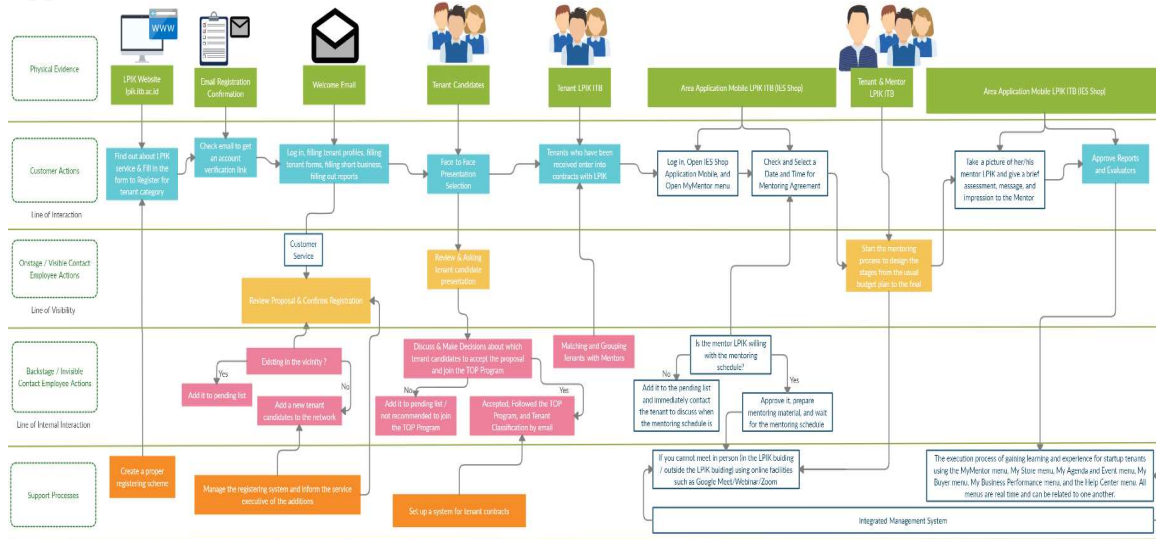


Figure 1. Service Design/Service Blueprint Development Program at IES LPIK ITB

Table 1. Implementation Plan for Mobile Application IES Shop LPIK ITB

Task Name	Duration	Resource
IES Shop (Design Thinking and Prototype Model SDLC methods)	81.75 days	
Requirement Analysis (Design Thinking: Empathize, Define, Ideate)	6.38 days	
Brainstorming	3 hrs	Business Analyst
Market Research	1 day	Business Analyst
Mind Mapping	1 day	Business Analyst
Concept Testing	2 days	Business Analyst
Requirement Gathering	2 days	Business Analyst
Quick Design and Prototyping	6 days	
Conceptual Prototype	3 days	System Analyst
UI Prototype/Mockup	3 days	System Analyst
Design Database Schema (Entity Relationship)	2 days	System Analyst
Design Application Architecture	1 day	System Analyst
Design Business Process	3 days	System Analyst
Initial User Evaluation (Design Thinking: Test)	10 days	
Prototype Testing by End User	7 days	Business Analyst
Analyze Strength and Weakness of All Prototype Model	3 days	Business Analyst
Refining Prototype	4 days	
Analyze User Feedback and Suggestions	2 days	Business Analyst, System Analyst
Change Conceptual Prototype	2 days	System Analyst
Change UI Prototype/Mockup	2 days	System Analyst

Change Application Architecture	2 days	System Analyst
Change Business Process	2 days	System Analyst
Implement, Test Product, and Deployment (Design Thinking: Implementation, Software Engineering: Test Driven Development)	13.38 days	
Implement Database Schema	3 hrs	System Analyst
Implement Application Architecture	0.63 days	
Setup Architecture REST API, Unit Tests, and CI/CD Environment	5 hrs	Backend Programmer
Setup Mobile Application Architecture, Unit Tests, and CI/CD Environment	5 hrs	Mobile Programmer
Implement Backend REST API	10 days	
Implement and Unit Tests IES Shop Customer API	5 days	Backend Programmer
Implement and Unit Tests IES Shop Seller API	5 days	Backend Programmer
Implement Frontend (Mobile Application)	10 days	
Implement and Unit Tests IES Shop Customer API	5 days	Mobile Programmer
Implement and Unit Tests IES Shop Seller API	5 days	Mobile Programmer
Integration Module and Integration Testing	1 day	
Integration and Integration Testing Backend REST API	1 day	Backend Programmer
Integration and Integration Testing Mobile Application	1 day	Mobile Programmer
Smoke Testing	1 day	System Analyst, Business Analyst
Deployment	0.75 days	
Backend Deployment on LPiK Server or Cloud Server	3 hrs	Backend Programmer
Mobile Application Deployment on Apps Store (iOS) and Google Play store (Android)	3 hrs	Mobile Programmer
Post Deployment	42 days	
Team and Project Evaluation	1 day	Backend Programmer, Business Analyst, Mobile Programmer, System Analyst
Project Documentation	1 day	Business Analyst, System Analyst
Maintenance	40 days	
Bug Fixing, List User Response and Suggestion, Application Monitoring, and Server Monitoring	40 days	Backend Programmer, Mobile Programmer

Resource	Cost
Business Analyst	Rp13.680.000
System Analyst	Rp13.804.000
Mobile Programmer	Rp16.960.000
Backend Programmer	Rp16.960.000

The Total Minimum Estimated Budget for Mobile Application IES Shop (with The Design Thinking and Prototype Model SDLC methods) Rp65.404.000