

# System Entities Approach for First Step to Design System That Connecting Small and Medium Enterprises (SMEs) and Researchers

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**Keywords:** system planning, entity system, requirement modelling, SMEs, system requirement.

**Abstract:** The purpose of this study is to analyse the system planning and attributes in an entity system for the first step to design systems that are involved in the entity system for the research marketplace that will be developed. For the first, by using SWOT analysis as tool for strategic planning the opportunity to develop a research marketplace is needed especially for the purpose that researchers and SMEs can interact with each other. Then entity system is part of requirement modelling. During requirements modelling, systems developers must identify and describe all system requirements. System requirements fall into five general categories: outputs, inputs, processes, performance, and controls. Based on SWOT analysis for strategic planning, the opportunity to develop a research marketplace is very large. From strategies formed, the results of the SWOT analysis and the mission that want to achieve are directly proportional to goals and objectives. This is a strong reason why research markets can be formed. The last stages of modelling requirements with the entity system approach are the inputs, processes, outputs desired by SMEs and their respective researchers have been grouped.

## 1 INTRODUCTION

Small and Medium Enterprises (SMEs) are the main player in domestic activity in Indonesia. They faced many problems while running their business. The research conducted by researchers in Indonesia has not been fully integrated with SMEs. The research result (both from Universities and research institutions) has unfortunately not yet fully adopted by the community, especially the SMEs. The problems in SMEs are solved by discussing with other SMEs or searching on Google with a similar case. Many researchers in Indonesia but the research results and technology developed are not appropriate with the users, such as industry, government, and society. (Febriani and Dewobroto, 2018) Commercialization of research results is important when seen from an economic standpoint to provide benefits for the country and also create jobs. From the other side, it can provide a forum for researchers to introduce their work that has the potential for change in the scientific world. One of the main factors influencing the commercialization of research results in Indonesia is the mismatch of research results with consumer needs.

So far, researchers and SMEs moved respectively. SMEs solve their problems and researchers look for research ideas without knowing where will be ap-

plied. The difficulty for researchers looking for a place to do research so more research using secondary data or dummy data to resemble characters required data or using data from previous studies. This is due to the difficulty to get data from a company because of the lack of cooperation between companies and researchers. During this time The Community Service program has been assessed as the basis for interacting with SMEs where they can work together with researchers to conduct research. This program is the implementation of the practice of science, technology, and cultural arts directly to the community institutionally through scientific methodology as a responsibility in an effort to develop community capabilities, so as to accelerate the pace of growth in achieving national development goals. The problems in SMEs for community service program are usually simple. But the problems in SMEs found in that program can be the basis for continuing into the real research. In addition, the research conducted was not sustainable or not integrated from the previous year because it was difficult to get partners for cooperation.

To bring together researchers and SMEs in order to help SMEs in solving their problems it takes a place that can bring together all. This place adopts the marketplace concept. For this research, it can be called a Research Marketplace. Marketplace knew

that has succeeded in bringing together many online sellers and consumers both in the fields of hospitality, finance, beauty, health, food, consumer goods, construction and so on. The research marketplace that wants to develop is based online where each SMEs can communicate with researchers without limited in time and distance. The research has been started since 2017, starting from the analysis of the quality of information for SMEs to the adoption of the results of research by understanding what kind of information is required and desired by SME (Febriani et al., 2017), it is expected that in the future, the research result may be fully adopted by SMEs. Then analyse the problems faced by SMEs and conduct a needs analysis using PIECES diagrams (Febriani and Dewobroto, 2018).

Requirement analysis still needs to be done to find out the input, process, and output (entity system in requirement modelling). It will be the first step before the move to the design system. Based on these problems, the purpose of this study is to analyse the system planning and attributes in an entity system for the first step to design systems that are involved in the entity system for the research marketplace that will be developed.

## 2 METHODOLOGY

Data is collected by interviewing researchers (30 researchers from universities and research department) and SME owners (150 owners) who produce products and services.

### 2.1 Strategy Planning

There is no standard approach to strategic planning but strategic planning can be starts with SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis. SWOT analysis is one of strategic planning tools usually used to many situations that need a decision (Hay and Castilla, 2006).

### 2.2 System Entities

An entity is something that can describe data. Entities can also be interpreted as an individual that represents something tangible and can be distinguished by something else. In a real world model each Entity represents a group or family of uniquely identifiable person places, things, concepts or events of interest to the firm and about which the firm wants or must collect data or keep records. The data or records about each entity describe what they are, what they look like, how they are used, what purpose they serve, what actions

they take or what actions are taken with or against them (Modell, 2007). In this entity system, inputs, processes, outputs, roles, rules, and stakeholders will be seen to be involved in this research marketplace. Entities have an important role in the database system because if there is no set of entity database systems are not formed. The entity system approach is also part of requirement modelling.

## 3 THE RESULTS

Strategic planning begins with conducting the SWOT analysis. SWOT is an acronym for Strengths, Weaknesses, Opportunities and Threats. SWOT Analysis is a tool used for strategic planning and strategic management in organizations. It can be used effectively to build organizational strategy and competitive strategy (Gürel and Tat, 2017).

SWOT Analysis is a strategic planning framework used in evaluation of an organization, a plan, a project or a business activity. SWOT Analysis is therefore a significant tool for situation analysis that helps the managers to identify organizational and environmental factors. SWOT Analysis has two dimensions: internal and external. The Internal dimension includes organizational factors, also strengths and weaknesses, external dimension includes environmental factors, also opportunities and threats (Gürel and Tat, 2017). SWOT analysis for strategic planning defined based on the following criteria (Jyothi et al., 2008):

- a Strengths are internal attributes of the organization that are helpful to the achievement of the objective.
- b Weaknesses are internal attributes of the organization that are harmful to the achievement of the objective.
- c Opportunities are external conditions that are helpful to the achievement of the objective.
- d Threats are external conditions that are harmful to the achievement of the objective.

STRENGTHS	WEAKNESS
SMEs increasingly grow up and problems are getting more complicated.	SMEs and researchers are not fully connected.
The wishes and needs of researchers so that research results can be applied or can be commercialized.	It is difficult for researchers to work with big companies so that sometimes they use dummy data.
The research results can be used as a support for decision making.	SMEs do not know researchers who are experts (according to their fields) who can solve the problem at hand.
SMEs do not need a deeper theory because SMEs only need the final results that can help solve the problem.	The output of research has been scientific journals and rarely used directly by the public.
OPPORTUNITIES	THREATS
The development of a forum that can connect researchers and SMEs to interact with each other.	For the next, it will be the research marketplace from a competitor.
The existence of a research marketplace has a great opportunity for the research result that can be applied and the development of SMEs will increase.	The possibility of copyright infringement will happen if security is not organized well and the right strategy is not applied to the research results.
Communication is tied with all SMEs and researchers in all around Indonesia.	

Figure 1: SWOT analysis both SMEs and researchers.

Based on the results of the SWOT analysis, the opportunity to develop a research marketplace is needed

especially for the purpose that researchers and SMEs can interact with each other. This can also be supported by the results of the PIECES framework where in terms of performance, information, economic, efficiency, and service are far better by forming a research marketplace.

There is no standard approach to strategic planning. Beside swot analysis, a firm’s mission statement should contain an inspirational message to its stakeholders. The majority of analyst view the strategic planning process as a dynamic interaction similar in Figure 1 that show where the mission statement reflects a long-term horizon, but sets forth goals that are achievable and consistent with realworld conditions (Shelly and Rosenblatt, 2012).

A mission statement is just the starting point. Next, identifies a set of goals that will accomplish the mission. To achieve those goals, then develops a list of shorter-term objective. Objectives also might include tactical plans. Finally, the objectives translate into day-to-day business operations, supported by IT and other corporate resources. The outcome is a set of business results that affect company stakeholders.



Figure 2: Strategic planning is a dynamic process that identifies specific goals and objectives that support the mission

The mission of this study is of course that the problems of SMEs can be overcome and the research results can be fully utilized by not only being a scientific journal. The goal for this research is for SMEs and researchers to interact with each other so that the problems of SMEs can be resolved and research results can be fully utilized. To achieve this goal, so the objective is to create a meeting place between SMEs and researchers in the form of a research marketplace. In general terms, a system is described as an entity (unit) where there is input that enters the system and processes it, so it comes out as output.

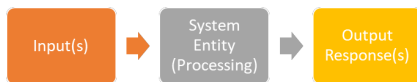


Figure 3: System entity

The picture above is the basis of a system entity. This picture is not yet clearly explained the importance of elements a system. The entity construction should clearly describe what the system and the element in it. Not only input and output, but in a system should also be stakeholders involved, mission and objectives, opportunities, threats, and control. The Mission, objectives, and opportunities, in general, have been explained in system planning.

Entity system is part of requirement modelling. During requirements modelling, systems developers must identify and describe all system requirements. A system requirement is a characteristic or feature that must be included in an information system to satisfy business requirements and be acceptable to users. System requirements serve as benchmarks to measure the overall acceptability of the finished system. System requirements fall into five general categories: outputs, inputs, processes, performance, and controls.

<p><b>The Outputs:</b></p> <ol style="list-style-type: none"> <li>1. Research marketplace must be able to show research results which show information past and present (of course with good policy and security to avoid plagiarism and copyright of researchers)</li> <li>2. Information from research results must be up to date and show the information needed.</li> <li>3. The information can present in detail (charts or graphics), detail analysis, and detail alternative decisions.</li> <li>4. The system must show the profile details of both SMEs and researchers.</li> <li>5. The system must show the satisfaction of cooperation between SMEs and researchers (can be with stars).</li> <li>6. Show a research time schedule from the beginning until the research estimation is complete.</li> </ol>	<p><b>The Inputs:</b></p> <ol style="list-style-type: none"> <li>1. The SMEs and researchers must provide details of each profile. Such as for researchers must provide their expertise, research track record, and others. SMEs must provide the business type, length of business, problems often faced and others.</li> <li>2. SMEs must input detailed problems and detailed data, such as product defect data, over time data and others.</li> <li>3. The researcher must provide the research results in detail including the results of the analysis that will enter into the data center.</li> <li>4. Data entry screens must be uniform, except for background color, which can be changed by the user.</li> <li>5. Providing satisfaction assessment of good cooperation between researchers and SMEs.</li> </ol>
<p><b>The Process:</b></p> <ol style="list-style-type: none"> <li>1. Calculate the average satisfaction of cooperation between SMEs and researchers.</li> <li>2. Update information on research results needed by SMEs.</li> <li>3. Show the pictures or charts as a research results analysis.</li> <li>4. Calculate the time schedule of research starting from the beginning to completion of the study.</li> </ol>	<p><b>The Performance:</b></p> <ol style="list-style-type: none"> <li>1. The system must support many users online simultaneously.</li> <li>2. Response time must not exceed four seconds.</li> <li>3. The system must be operational seven days a week, 365 days a year.</li> <li>4. The research results that have been completed can be seen at any time.</li> </ol>
<p><b>The control and Security:</b></p> <ol style="list-style-type: none"> <li>1. The system must provide logon security at the operating system level and at the application level.</li> <li>2. The research results can be accessed in detail only for SMEs who have problems and researchers who work together to solve them.</li> <li>3. There is a cooperation agreement that must be agreed upon by SMEs and researchers.</li> <li>4. The system must create an error log file that includes the error type, description, and time.</li> </ol>	<p><b>The Stakeholder:</b></p> <ol style="list-style-type: none"> <li>1. SMEs</li> <li>2. Researchers</li> </ol>

Figure 4: System entity as part of system requirement.

The future of this research is to establish a framework for the development of research markets. Based on the system development life cycle, the next step is system design where it starts designing object-based with UML until it reaches program implementation. The limitation of this study is a large number of fields of SMEs and researchers so that it is not biased to classify researchers according to their fields and SMEs according to the type of product produced.

## 4 CONCLUSIONS

Based on SWOT analysis for strategic planning, the opportunity to develop a research marketplace is very large. From strategies formed, the results of the SWOT analysis and the mission that want to achieve are directly proportional to goals and objectives. This is a strong reason why research markets can be formed. The last stages of modelling requirements with the entity system approach are the inputs, processes, outputs desired by SMEs and their respective researchers have been grouped.

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