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TABLE OF CONTENTS

Development a Generic Transaction Processing System Based on Business Process Metadata

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Abstract

The business process has a major role in organization activities. Various information systems supporting organization business processes, one of them is the transaction processing system that serves to record the daily routine transactions necessary in running a business. In the system implementation, often occur repetitive coding for additions or changes to the business process. Business processes consist of a collection of related activities. To overcome the repetitive coding implementation, relations between activities must be modeled. In this research, business processes mapping to data level using a metadata approach is proposed as a solution to manage any execution services build in the information systems so that developers can focus on business process flows. The data model divide business process into three building blocks: event, task and gateway. The transaction processing system and the executor of the business process have been developed based on designed metadata. The test results concluded that metadata is able to define the business process, and the executor can control the flow of executions of business processes correctly.

Keywords: Business process, data model, transaction processing system, executor.

Introduction

In the implementation of activities within an organization, there are administrative processes that must be done to sustain continuity. The administrative process generally involved the process of recording, file processing and simple bookkeeping. Information technology is advancing faster than technologies for physical processing (Porter & Millar, 1985). Now the process and information technology are viewed as industrial engineering that can change how an organization works (Davenport & Short, 1990). Based on the phenomenon a few ideas to use information technology simplified and fasten the administration process of organizations. Organizations can have different types of information systems, one of which is a transaction processing system. Information technology is advancing faster than technologies for physical processing (Porter & Millar, 1985). Now the process and information technology are viewed as industrial engineering that can change how an organization works (Davenport

& Short, 1990). Based on the phenomenon a few ideas to use information technology simplified and fasten the administration process of organizations. Organizations can have different types of information systems, one of which is a transaction processing system. Transaction processing systems (TPS) are the basic business systems that serve the operational level of the organization. A transaction processing system is a computerized system that performs and records the daily routine transactions necessary to the conduct of the business.

Transaction processing systems are typically built to support the needs of very specific business processes. It would be a problem if there are additional or changes in supported business processes that causing repetitive coding activities to implement the business processes. Solutions to that problem have been found by Terahadi and Widagdo (2014). Terahadi and Widagdo (2014) have successfully developed a data model capable of storing information about business processes and create an *executor* to execute business processes based on user-defined queries. The relation between the activity successfully saved so that business processes can be manually executed correctly.

This research will focus on developing the data model of business processes to store the relationships among the activities to allow the definition of rules for each relationship. A transaction processing system constructed by utilizing the data model as a solution to the problem of repetitive coding during the implementation of business processes into information systems.

Literature

Transaction Processing System

Transaction processing systems (TPS) are the basic business systems that serve the operational level of the organization. A transaction processing system is a computerized system that performs and records the daily routine transactions necessary to the conduct of the business (Srinivas & DBA, 2012). Transaction processing system has the following characteristics (Ghaebi, 2016):

- Input: transaction or event
- Process: adding, updating, sorting and listing.
- Output: detailed reports; lists; summary
- User: operational personnel, supervisor

Metadata

Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Metadata is often called data about data or information about information (NISO, 2004).

Business Process

Michael Hammer and James Champy define a business process as a collection of activities that take one or more kinds of input and create an output that is of value to the customer (Hammer & Champy, 2009). Execution constraints between activities are identified by Davenport, who defines a business process as "a set of logically related tasks performed to achieve a defined business outcome for a particular customer or market.". Davenport also considers the relationship of process activities, including their execution ordering, by defining a business process as "a specific ordering of work activities across time and place, with a beginning, an end, and identified inputs and outputs." He continues, "business processes have customers (internal or external) and they cross organizational boundaries, i.e., they occur across or between organizational subunits." (Davenport & Short, 1990).

Business Process Modelling Notation

Many notations that can be used to perform business process modeling, two business process modeling notation that widely used are YAWL and BPMN.

1) YAWL is both a workflow modeling language and an open-source workflow system [8]. The acronym YAWL stands for "Yet Another Workflow Language". Figure 1 shows the main notation of YAWL. YAWL notation consists of *condition, task* and *decorator*.

2) BPMN (Business Process Modelling Notation) has become one of the most widely used languages for the business process model. BPMN is supported by many tools (tools) and has been standardized by the *Object Management Group* (OMG). Figure 2 shows the main notation of BPMN. BPMN notation consists of *event, task* and *gateway*.
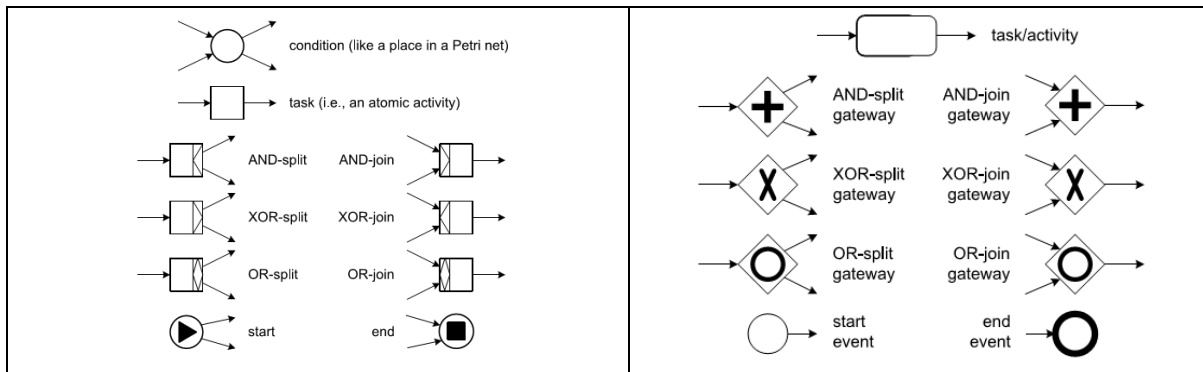
| **Figure 1. YAWL Notation** | **Figure 2. BPMN Notation** |
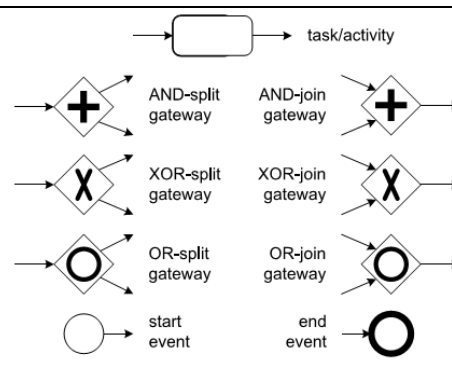
Business Process Patterns

Workflow Pattern Initiative classifies patterns of the business process into three main groups namely the *control flow, data* and *resource* (Hofstede, et al., 2010)*.* These three groups have patterns as follows:

- *Control flow*
    - o Branching patterns: AND, OR, XOR split
    - o Synchronization patterns: AND, OR, XOR join
    - o Iteration patterns: structured loop, arbitrary cycles, and recursion
    - o Multiple Instance (MI) patterns
    - o Concurrency patterns
    - o Cancellation patterns
    - o Trigger patterns
    - o Termination patterns: Implicit, and explicit termination
- *Data*
    - o Data visibility patterns
    - o Data interaction patterns
    - o Data transfer patterns
    - o Data-based routing patterns

Related Research

Research related to business process modeling has been carried out by (Terahadi & Widagdo, 2014) and (Sunindyo, et al., 2014). Both of these studies do not support the execution of business processes automatically. The data model that found is not capable of storing rules to automatically select the route.

Research Methodology

This research uses the Waterfall Method which includes:

Requirements analysis and definition

At this stage, the analysis conducted by researchers are:

1. Analysis of old system weaknesses

In the analysis of the weaknesses of the old system, the researcher uses analysis with the SWOT analysis.

2. Requirement analysis

The researcher analyzes the system requirements obtained from the analysis of system weaknesses.

System and software design

At this stage the researcher will implement the requirements in the form of blueprints. To assist in making the design of the system blueprint, the researcher uses Microsoft Visio 2016. The design stages include:

- *Flowchart* system.
- UML design (Use case diagram and *Sequence diagram*).
- *Entity Relationship Diagram* (ER Diagram).
- *Interface* Design

Implementation and unit testing

At this stage, software design is realized as a series of programs or program units. The testing involves verifying that each unit fills its specifications.

Integration and system testing

The individual units of the program are combined and tested as a complete system to verify whether it meets the software requirements or not. After the testing, the software can be delivered to the customer.

Operation and maintenance

Usually (although not always), this stage is the longest stage. The system is installed and used significantly. Maintenance involves correcting errors that are not found in the previous stages, increasing the implementation of the system unit, and improving system services as new requirements.

Analysis and Design

Analysis

Elements of process data: from the business process definition, found three main elements of business processes namely activities, the relationship between activities, and input/output. At the time of executing the business process, activities must be performed by a person or group of persons entitled to perform these activities.

Among the three main elements of the process data, the relationship between activities is the most important thing that must be addressed. The relationships between activities included in the control flow patterns. This is in accordance with the notation that defines the relationship between activities such as branching (*split*) and synchronizing (*join*).

Relationship between activities*:* Among the three main elements of the process data, the relationship between activities is the most important thing that must be addressed. Types of relationships between activity can be determined by comparing the notation of YAWL in *Figure 1* and *BPMN* in *Figure 2.* The beginning and end of the business process are expressed by the name of the *start* and *end event.* The relationship between activities described by the term *split* and *join gateway* consisting of three types namely AND, OR, and XOR.

By analyzing the business process modeling notation and patterns of business processes, it is known to the pattern that can be supported by this data model. The patters are described as follows.

- *Control flow*
  1. *Branching patterns*
     Branching or *split patterns* can be supported by the business process model because all the *split patterns* included in the data model.
  2. *Synchronization patterns*
     Synchronization or *join pattern* can be supported by the business process model because all the *join patterns* included in the data model
  3. *Iteration patterns*
     Iteration patterns are patterns that not have a special notation in YAWL or BPMN. However, the pattern can be formed by a combination of split and join. Iteration patterns can be supported by the business process model. *Recursive iteration patterns* cannot be supported because of the recursive calling from the activity itself before the activity completed.
  4. *Concurrency patterns*
     AND *join* is one of the concurrency patterns. The data model can support this pattern.
  5. *Termination patterns*
     Explicit termination patterns can be supported by the data model because every business process that modeled has a specific endpoint.
  6. *Multiple Instance (MI) patterns, Cancellation patterns,* and *Trigger patterns* are not supported because it is not included in the process model.
- *Data*
  Data-based routing pattern is supported by the model because of the process flow control rule can be stored into the data model.

Business process metadata*:* The terms that used in metadata are from BPMN such as an *event, task* and *gateway*. These three terms hereinafter referred to *base process*:

- *Event,* is a *base process* that placed in the beginning and the end of the business process.
- *Task,* is a *base process* that generates *output*.
- *Gateway*, is a *base process* that manages the *control flow* of the business process.

Modeling of process business metadata

Business process metadata described using *Entity-Relationship Diagram* (ERD) in Figure 3. There are nine entities namely, *process, base process, data, role, event & task, gateway, storage, process execution,* and *process execution step. Gateway entity* has relationships with the base process entity to determine the type of logic gate that will be used on the gateway. A gateway can have a logic gate and pointed to several base processes.

Overview of the Information System

The type of information system is a transaction processing system. This system only supporting simple information processing and unable to interact with external systems. This information system is divided into two parts, namely the *configuration* and *execution*.
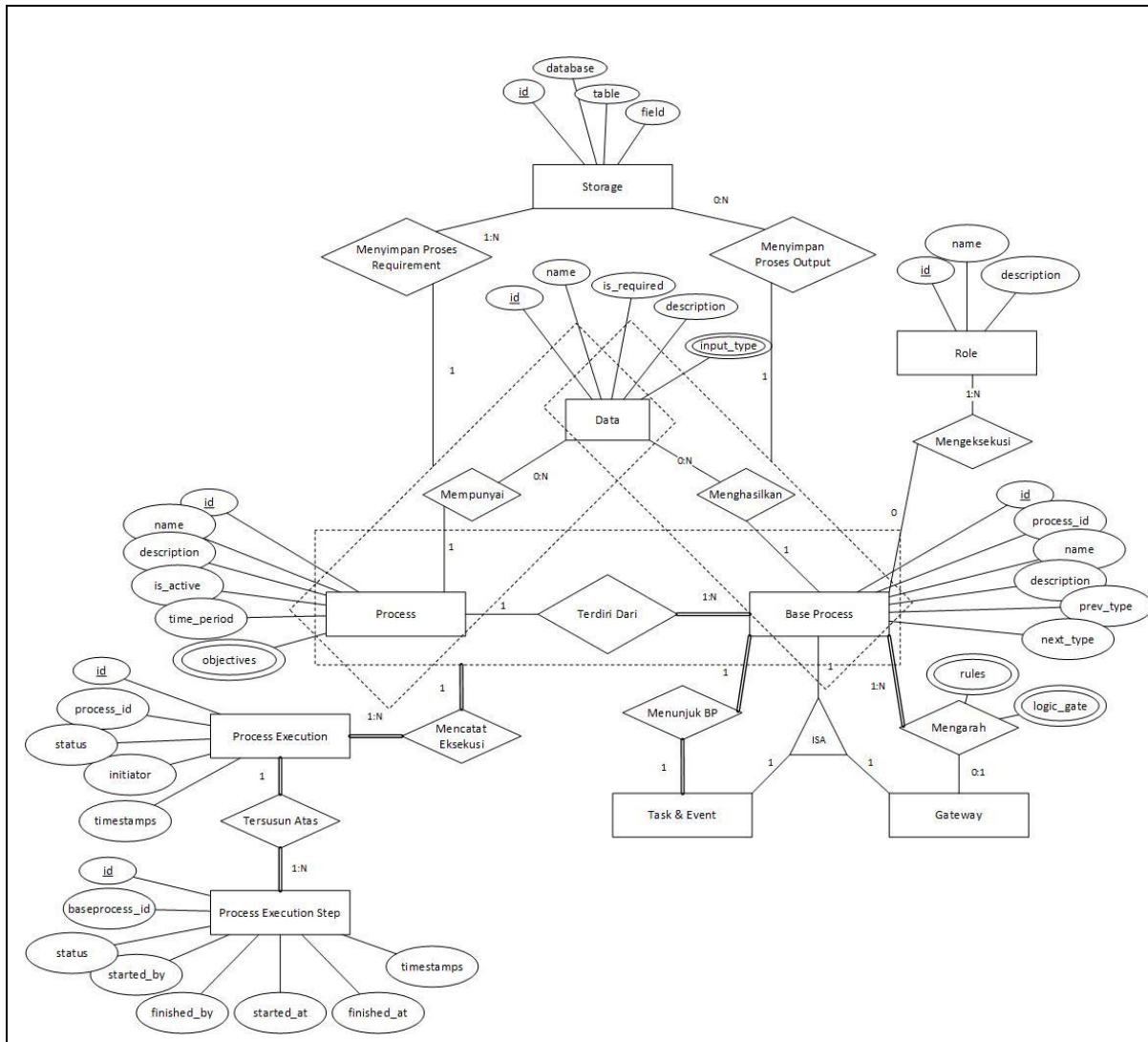
Figure 3. Entity Relationship Diagram (ERD) business process metadata

1) ***Business process configuration*** is the activity of defining business processes and their relationship to the metadata. The system *administrator* can perform business process configuration.

2) ***Business process execution*** is the activity of running a business process that has been defined. At the time of execution, the business process initiated by the roles that exist in the information system. Once initiated, the task of the business process executed by the respective role. The executor of business processes designed to control execution flow based on the relationship between the *base process* that has been defined. *Figure 4* is a flowchart that illustrates the execution flow of business processes.

Development and Testing

Design of Information System

1) ***Functional requirements of information systems***: divided into two functional needs namely, *configuration* and *execution* of the business process. Each functional requirement can be viewed in *Table 1* and *Table 2*.
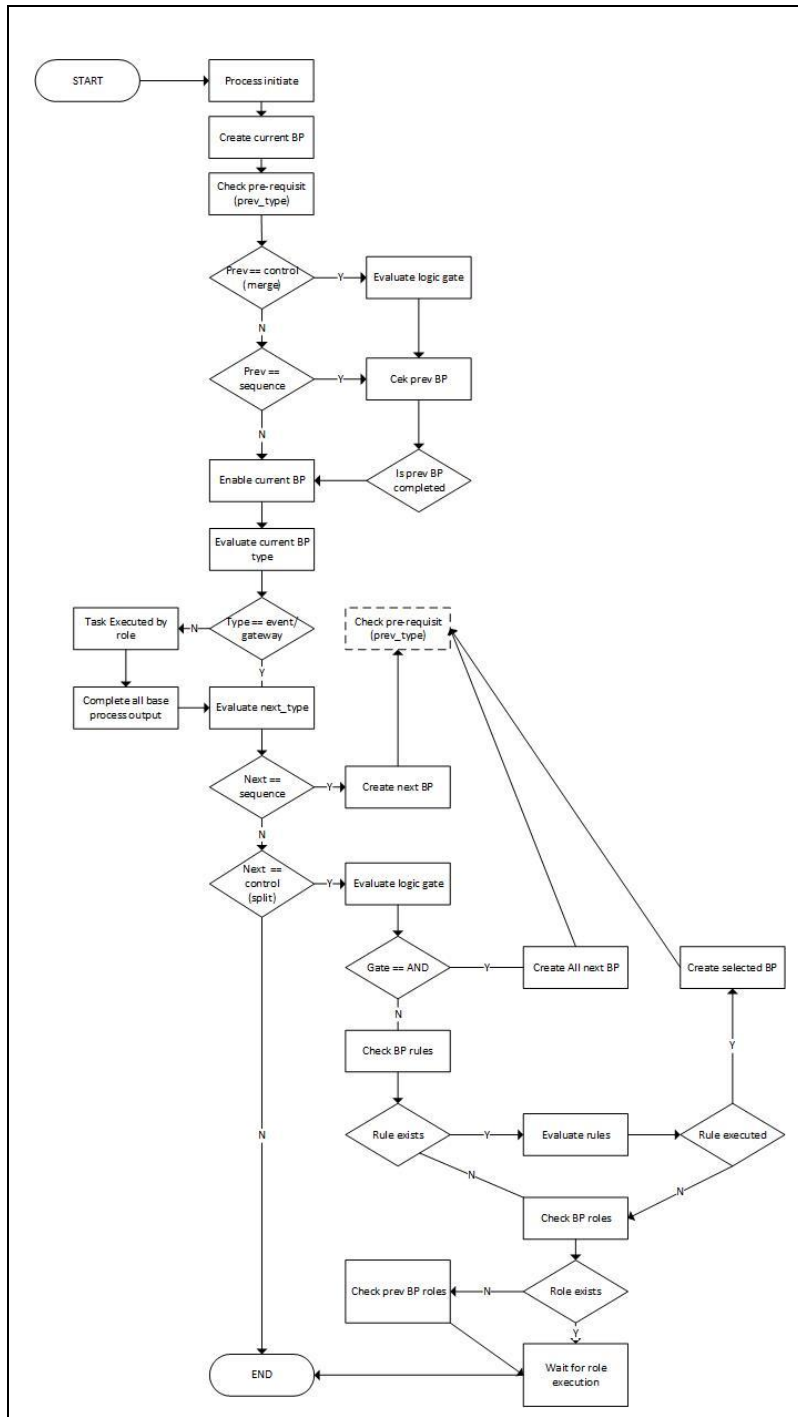
Figure 4. Process business execution

Table 1. Functional requirement for business process configuration

No	SRS ID	Description
1	SRS-CON-1	An administrator can perform CRUD connection
2	SRS-CON-2	An administrator can perform CRUD role
3	SRS-CON-3	An administrator can perform CRUD user
4	SRS-CON-4	An administrator can perform CRUD business process

Table 2. Functional requirement for business process execution

No	SRS ID	Description
1	SRS-EXE-1	User can start business processes
2	SRS-EXE-2	User can perform tasks according to the role owned
3	SRS-EXE-3	The executor can control the flow of business process execution
4	SRS-EXE-4	The executor can move operational data into operational data storage location that has been defined

2) *Modeling of information system requirements*: the entire functional requirements are modeled in the form of *use cases* that can be seen in *Figure 5* and *Figure 6*.
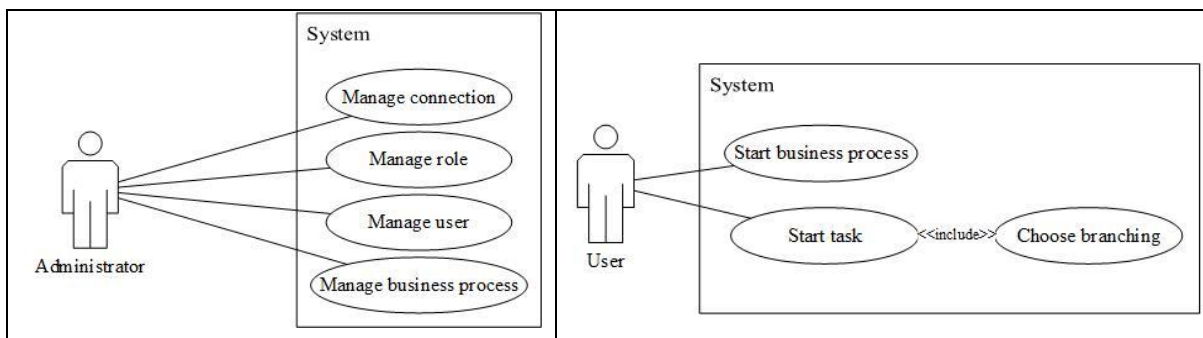
Figure 5. Use case for configuration of business process

Figure 6. A use case diagram for execution of the business process

3) *Class design*: The design and implementation of information stem using an object-oriented approach. In object-oriented approach, the identification of classes is required to build the information system. The class diagram is shown in *Figure 7*.

Implementation

The ERD has been created is translated into relational tables which can be seen in Figure 8 and Figure 9. There are 22 tables formed by the ERD of business process metadata.

Testing

1) *Objectives*: tests performed had two objectives:
- Find out whether the information system can function properly in accordance with the functional requirement that has been set.
- Test whether patterns and the rules that have been defined in the business process successfully executed.
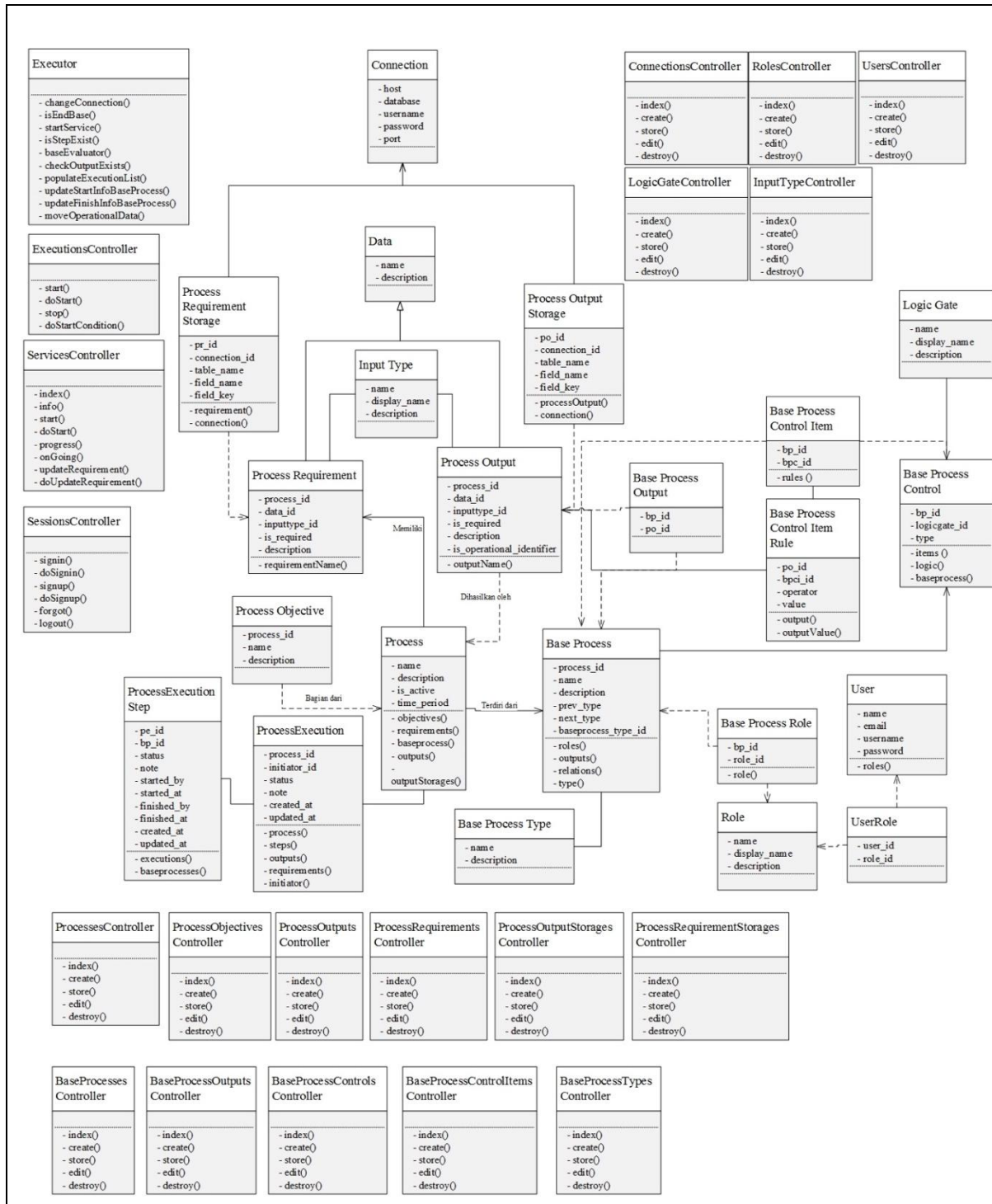
Figure 7. Process business execution
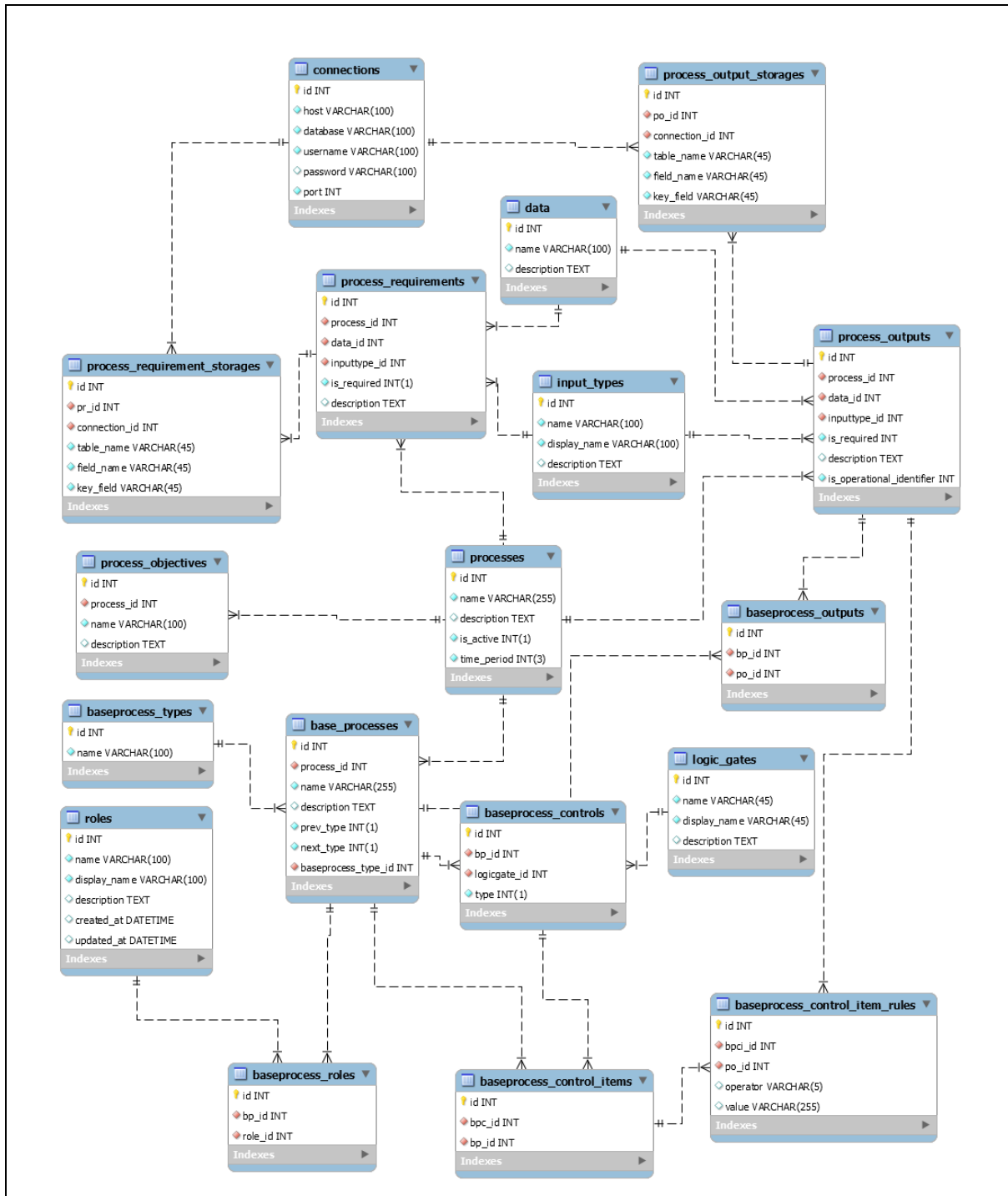
Figure 8. Relational table for configuration stage
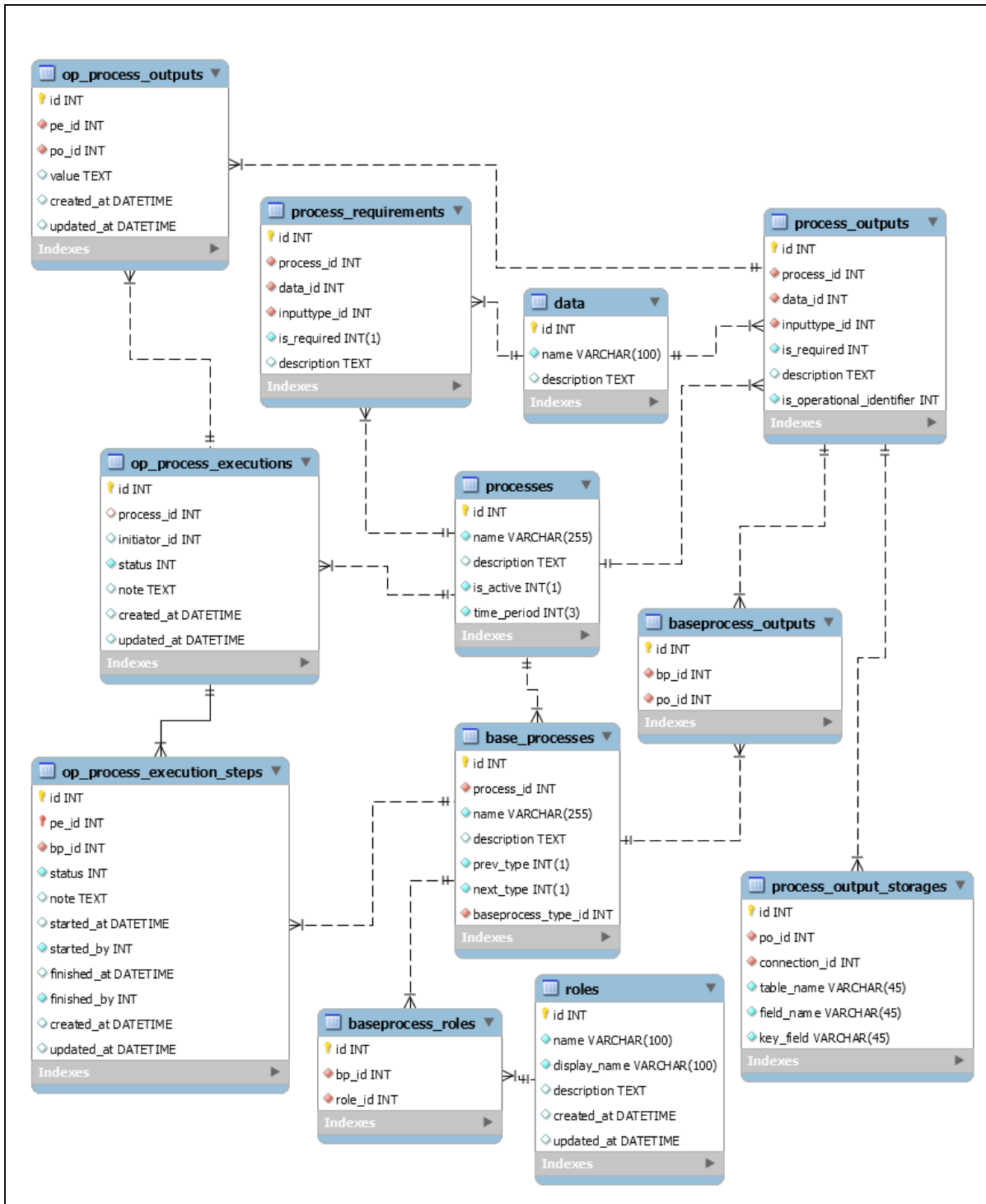
Figure 9. Relational table for execution stage

2) **Testing scenario**: testing is divided into two test, configuration, and execution test. The configuration test is done by defining business processes into information systems, this can be seen on *Figure 10*. The execution test is done by running the business processes that have been defined. The test case is a credit card submission process, this process has *split, join,* and *recursive* activity that can be seen on *Figure 11*.

Process Overview : Pengajuan Kartu Kredit

No	Base Process	Type	Roles	Output (Storages)	Relationship Previous	Relationship Next
1	Start	Event			None	Type : Sequence Logic Gate : None Relation(s): - Receive Application
2	Receive Application	Activity	Clerk	Amount (0)	Type : Sequence Logic Gate : None Relation(s): - Start	Type : Sequence Logic Gate : None Relation(s): - XOR split
3	XOR split	Gateway	Clerk		Type : Sequence Logic Gate : None Relation(s): - Receive Application	Type : Control Logic Gate : XOR Relation(s): - Large Amount Check Rule(s): - Amount > 500 - Small Amount Check Rule(s): - Amount <= 500
4	Large Amount Check	Activity	Bank Manager	Accepted (0)	Type : Sequence Logic Gate : None Relation(s): - XOR split	Type : Sequence Logic Gate : None Relation(s): - XOR Join
5	Small Amount Check	Activity	Bank Employee	Accepted (0)	Type : Sequence Logic Gate : None Relation(s): - XOR split	Type : Sequence Logic Gate : None Relation(s): - XOR Join
6	XOR Join	Gateway			Type : Control Logic Gate : XOR Relation(s): - Large Amount Check - Small Amount Check	Type : Sequence Logic Gate : None Relation(s): - XOR Split
7	XOR Split	Gateway	Bank Employee Bank Manager		Type : Sequence Logic Gate : None Relation(s): - XOR Join	Type : Control Logic Gate : XOR Relation(s): - Assign Card Rule(s): - Accepted == 1 - Notify Rejection Rule(s): - Accepted != 1
8	Assign Card	Activity	Bank Employee		Type : Sequence Logic Gate : None Relation(s): - XOR Split	Type : Sequence Logic Gate : None Relation(s): - AND Split
9	AND Split	Gateway	Bank Employee		Type : Sequence Logic Gate : None Relation(s): - Assign Card	Type : Control Logic Gate : AND Relation(s): - Notify Customer - Send Card
10	Notify Customer	Activity	Bank Employee		Type : Sequence Logic Gate : None Relation(s): - AND Split	Type : Sequence Logic Gate : None Relation(s): - AND Join
11	Send Card	Activity	Bank Employee		Type : Sequence Logic Gate : None Relation(s): - AND Split	Type : Sequence Logic Gate : None Relation(s): - AND Join
12	AND Join	Gateway			Type : Control Logic Gate : AND Relation(s): - Notify Customer - Send Card	Type : Sequence Logic Gate : None Relation(s): - Stop
13	Notify Rejection	Activity	Bank Employee		Type : Sequence Logic Gate : None Relation(s): - XOR Split	Type : Sequence Logic Gate : None Relation(s): - Stop
14	Stop	Event			Type : Control Logic Gate : XOR Relation(s): - AND Join - Notify Rejection	None

Figure 10. The configuration of credit card submission into the information system
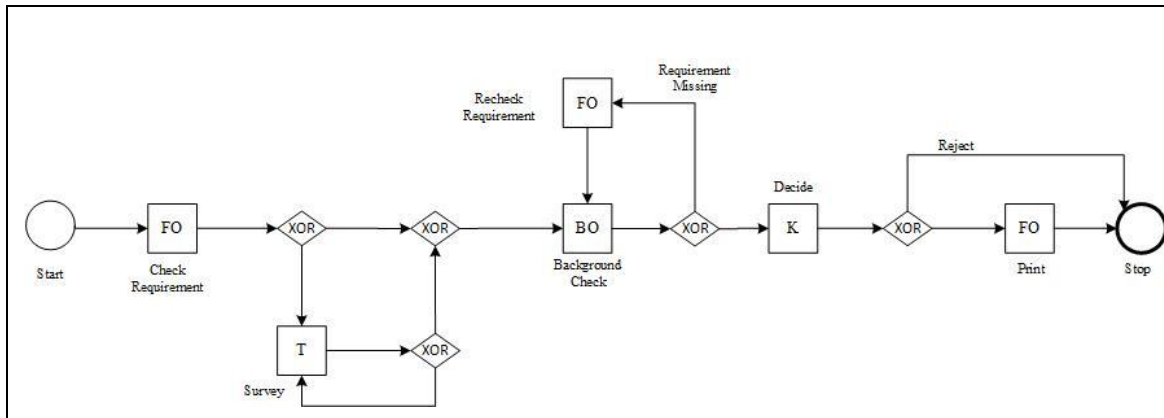
Figure 11. Flow for credit card submission

3) ***Testing result***: based on test results of business process configuration can be seen in *Figure 11* the entire functional requirement of configuration base process successfully implemented. The entire test case that have been defined successfully executed. Execution results can be seen in *Table 3*.

Table 3. Evaluation of test case credit card submission

Path	Base Process	Role	Data
1	Start		
	Receive Application	FO	Amount = 100
	Small Amount Check	BE	Accepted = 1
	Assign Card	BE	
	Notify Customer	BE	
	Send Card	BE	
	Stop		
2	Start		
	Receive Application	FO	Amount = 100
	Small Amount Check	BE	Accepted = 0
	Notify Rejection	BE	
	Stop		
3	Start		
	Receive Application	FO	Amount = 600
	Large Amount Check	BM	Accepted = 1
	Assign Card	BE	
	Notify Customer	BE	
	Send Card	BE	
	Stop		

4	Start		
	Receive Application	FO	Amount = 600
	Large Amount Check	BM	Accepted = 0
	Notify Rejection	BE	
	Stop		

4)   ***Analysis of the test result****:* The data model is able to store business processes and the relationship between activities in business process. Executor successfully execute the business process patterns that exist in business process. Executor successfully perform flow control process based on the rule that has been defined. After the execution of business process, the data generated during the execution were successfully stored into the operational database.

Conclusion

Based on all the stages that have been implemented in the research, some conclusions can be drawn as follows:

1. Business process metadata developed by analyzing patterns that exist in business processes can store relationships between activities in a database structure. This enables the automation of the execution of relations between activities by adding rule relations between activities. The transaction processing system can be used to define and execute business processes that have been defined.
2. The information system that was built has been successfully used to configure business processes. Business process compilers such as activities, process requirements, data generated by activities, data storage locations, relationships between activities, and rule relations between activities can be stored into business process metadata.
3. The information system that was built has succeeded in executing a business process that has been configured, either manually or automatically, based on the rule of relations between activities that have been defined. After the business process has been executed, the data that has been generated in the activity is stored in an operational database that has been defined at the configuration stage.
4. With this information system, the organization does not need to develop information systems from the beginning to save transactional and administrative data from a business process.
5. This information system only can check 1 rule at one time, for example, user age greater than 30 years.
6. This information system can be improved to handle more than one rule, for example, user age greater than 30 years and less than 40 years.

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Influence Factors of Social Media and Gadget Addiction of Adolescent in Indonesia

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Abstract

Social media user in Indonesia has growth rapidly since its emergence. In 2019, one of largest social media platform, Facebook has 3 billion world wide users and also 130 million users of them come from Indonesia. Moreover, the other social media like Instagram also has significantly growth with most of users are teenagers. Massive social media usage was caused by more than 100 million active users that use gadget or smartphone to open application like social media. Both of widely social media and gadget usage is not only have positive impact but also negative impact like mental and behavior problem if the user has been addicted. Hence the requirement of knowing influence factors of social media and gadget addiction in Indonesia is required in order to prevent addiction of social media and gadget. In this paper, the influence factors of social media and gadget addiction in Indonesia is investigated using several techniques like data science, partial least square, and structural equation modelling. The result: Time, Productivity and Relation are the factors of influencing social media and gadget addiction, meanwhile Thought is not the factor of influencing social media and gadget addiction.

Keywords: Social media addiction, gadget addiction, data science, partial least square, structural equation modelling

Introduction

Social media has widely used in worldwide particularly in Indonesia. It can be seen from one of social media platform, Facebook, which Indonesia users occupied the fourth-highest number world wide in 2018 (Millward 2018). Similar with Facebook, other popular social media, Instagram, reach 60 million users in Indonesia. Massive social media usage was caused by more than 100 million active users that

use gadget or smartphone to open application like social media. Both of widely social media and gadget usage is not only have positive impact but also negative impact like mental and behavior problem (Kempa 2015), and decrease of academic motivation (Prabandari and Yuliati 2016) if the user has been addicted. The last negative impact is seriously become threat for children and adolescent (Ashwini Veronica and Samuel 2016). Hence the requirement of knowing factors of social media and gadget addiction of adolescent in Indonesia is required in order to prevent addiction of social media and gadget. In this works, we conduct a research about influencing factors of social media and gadget addiction particularly in Indonesia. This research contributes to practical issues and theoretical issues. For theoretical issue, we investigate factors of influencing addiction in using social media and gadget whether there is significant correlation among factors to addiction. For practical issues, this research tries to give best practice to stakeholder to prevent social media and gadget addiction. The outline of this paper as follow: (1) introduction, (2) literature study, (3) research methodology, (4) Result, (5) Discussion and (6) Conclusion.

Literature Study

Based on prior research by Young et al about addiction of internet (Young 2015), there are twenty question or construct that can indicate someone who addicted by internet. Based on twenty questions, we classify to four categories like "time", "relationship", "productivity" and "thought". Time is defined by Sahin et al (2017) as prefer spend much time on the internet including social media and gadget and affect to life dissatisfaction. Based on this definition, indicator Q1, Q2, Q5, and Q6 are categorized as time variable. Relationship is defined by Veronica (Ashwini Veronica and Samuel 2016) as the usage of social media and gadget can be influenced by relationship with friends, hence the user can easily use social media and gadget influenced by influencer. Based on this definition, indicator Q3, Q4, Q13 are categorized as relationship variable. Productivity is defined as the laziness of doing real-life activity as well as waste much time for unimportant things (Prabandari and Yuliati 2016), hence indicator Q7, Q8, Q14 and Q15 are categorized as productivity variable. The last, Thought is defined as confidentially thought, negative thought, and fear thought of real-life. Hence indicator Q9, Q10, Q11, Q12 is categorized as thought variable. The remaining indicator: Q16, Q17, Q18, Q19, Q20 are categorized as social media and gadget addiction. Based on above explanation, Hypothesis is proposed as follow:

H1: Time is positively related with Social Media or Gadget Addiction
H2: Relationship is positively related with Social Media or Gadget Addiction
H3: Productivity is positively related with Social Media or Gadget Addiction
H4: Though is positively related with Social Media or Gadget Addiction

Four of hypothesis is then observed whether is there correlation or not with social media addiction. Propose model of influence factors of social media addiction can be seen as follow:
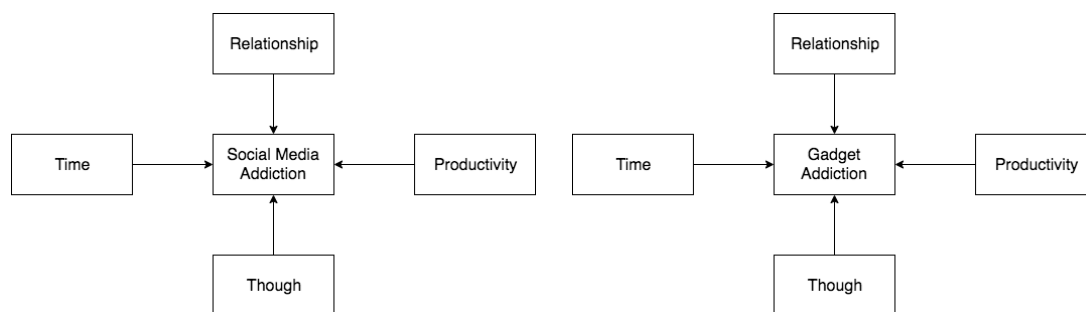
Figure 1. (Left) Influence Factors of Social Media Addiction propose model. The model consists of four factors that will be observed whether is there relationship to social media addiction. (Right) Influence Factors of Gadget Addiction propose model. The model consists of four factors that will be observed whether is there relationship to gadget addiction.

Research Methodology

This study is based on quantitative method, which consists of data analysis based on statistical method. Our measurement or construct is derived from prior empirical research: Internet Addiction by Young et al (Young 2015). The construct then modified and adjusted with condition in Indonesia. Final measurement model is in five-point Likert-type scale ranging from "strongly disagree" to "strongly agree". The question is then classified into several categories like "time", "relationship", "productivity" and "thought" based on deeply reading several prior research (Ashwini Veronica and Samuel 2016)(Buran Köse and Doğan 2019)(Şahın 2017). These classes then observed whether is there significantly relationship to social media and gadget addiction. All of construct of measurement is put on online form and spread out to selected audience. In addition, additional information like age, sex, occupation, last education, and city is included in form information.
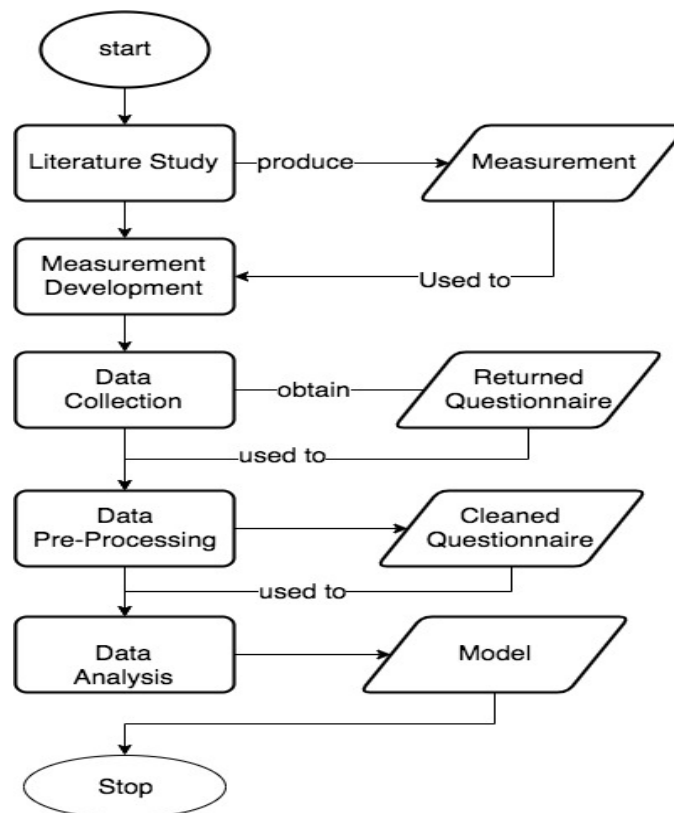
Figure 2. Research Methodology

The first step of research is study literature by reading prior research papers including journal, conference paper, news then measurement or construct is established. Measurement is then modified and adjusted with Indonesia environment. The next step is the measurement spread out to targeted audience then returned questionnaire in data collection. Then returned questionnaire is used in data pre-processing to remove inappropriate data. The last step, cleaning data is used in data analysis to obtain model influence factors of social media and gadget in Indonesia.

Data is collected from respondents who has experience in using social media and gadget. The criteria of respondents are having experience in using social media and gadget, the average of using gadget more than 6 hours per day, and the average of using social media more than 5 hours per day.

After gathering data, the data should be pre-processed in order to obtain cleaned data. We used data science techniques running on Python programming like feature selection (Ng 2004), and tabular pre-processing (Challenge and Scenes 2013) to select appropriate features used in data analysis.

In this research, combination of Structural Equation Modelling (SEM) (Hox and Bechger 1998) and Partial Least Square (PLS) (Hox 2010) is performed to accept and reject hypothesis. We used several variables output that can determine validity and reliability of model based on prior research (Pratama et al. 2017) like Alpha Cronbach, Correlation, Average Variance Extracted, Discriminant Validity, Consistent Reliability, and others.

In this research, combination of Structural Equation Modelling (SEM) (Hox and Bechger 1998) and Partial Least Square (PLS) (Hox 2010) is performed to accept and reject hypothesis. We used several variables output that can determine validity and reliability of model based on prior research (Pratama et al. 2017) like Alpha Cronbach, Correlation, Average Variance Extracted, discriminant validity, Consistent Reliability, and others.

Result

Data Collection

After performing measurement development, we obtained twenty questions complete measurement that can be accessed in appendix A. All of the question is derived from Young et all (Young 2015) strengthened by (Griffiths et al. 2016)(Kurniasanti et al. 2019) then modified based on condition in Indonesia. Based on literature study, the questions are classified into four categories: Time, Relationship, Productivity and Thought.

Table 1. Demography

Sex	
- Male	- 65%
- Female	- 35%
Occupation	
- Student	- 70%
- Lecturer	- 20%
- Worker	- 10%
Age	
- 10 – 24 years old	- 70%
- Other	- 30%

The data was collected in November 11th 2019 – November 20th 2019 from respondents who have experience in using social media and gadget. We used data science techniques to select appropriate data. From 1782 returned questionnaires, the average of respondent is 27.34 years old with 1089 male and rest are female. Most of respondent are students with 890 audience, the others are lecturer, and workers. Most of students are senior high school student with 713 data. We select merely student occupations for this work. Based on prior research, most of addiction person is dominated from between ages 10 – 24 years old and also categorized as adolescent, hence we select only this audience, hence we omit other respondents. We also used L1 feature selection to apply penalty over coefficient that multiply each of predictors. After performing feature selection techniques as well as tabular data pre-processing, we obtained final cleaned questionnaire 385 data. This data is used in analysis.

Social Media Addiction

First step, we tested the construct whether feasible to be used using outer model analysis. because none of instrument lower than threshold 0.6, hence none of indicators or instrument should be deleted. We

measure validity of model using Convergent Validity by utilizing Average Variance Extracted (AVE). Complete AVE score can be seen in Table 2.

Table 2. Loading Factor Social Media Addiction

Variable	Indicator	Loading Factor	AVE	CR
Time (H1)	Q1	0.622	0.602	0.856
	Q2	0.831		
	Q5	0.791		
	Q6	0.839		
Relationship (H2)	Q3	0.877	0.730	0.890
	Q4	0.861		
	Q13	0.824		
Productivity (H3)	Q7	0.555	0.667	0.776
	Q8	0.659		
	Q14	0.722		
	Q15	0.778		
Thought (H4)	Q9	0.758	0.667	0.889
	Q10	0.795		
	Q11	0.829		
	Q12	0.880		

In order to ensure our model is valid, we use additional measurement, discriminant validity and compare AVE square root with each instrument. For example, in Thought AVE square root (0.817) is greater than other, productivity AVE square root is also greater than others. Complete discriminant validity can be seen in Table 3. For ensuring our model reliability, we used two variables: Composite Reliability (CR) and outer loading. All of CR score is greater than threshold 0.7, hence our model is fulfill internal consistent reliability.

Table 3. Discriminant Validity Social Media Addiction

	Thought	Productivity	Relationship	Time
Though	0.817			
Productivity	0.630	0.684		
Relationship	0.742	0.654	0.855	
Time	0.632	0.563	0.662	0.776

For the last step, structural test using Structural Equation Modelling is performed to test hypothesis model. Bootstrap is performed to generate random sampling to our construct. Final result can be seen as follow:

Table 4. Bootstrapping Social Media Addiction

Hypothesis	Path Coef	Sample Mean	STDEV	t	Sig
H1 → AMSG	0.195	0.207	0.08	2.25	*
H2 → AMSG	0.172	0.161	0.124	1.39	*

H3 → AMSG	0.475	0.488	0.093	5.114	*
H4 → AMSG	**-0.09**	**-0.08**	**0.112**	**0.805**	**NS**

Based on computational using SEM techniques, hypothesis H4 (Thought) is rejected because it did not meet t > 1.972 with significant level 0.01, 0.05 or 0.1. Other hypothesis, based on result, factors that influence social media addiction of adolescent in Indonesia are H1 (Time), H2 (Relationship), and H3 (Productivity).

Gadget Addiction

Similar with social media addiction, the construct is evaluated whether feasible to be used using outer model analysis. because none of instrument lower than threshold 0.6, hence none of indicators or instrument should be deleted. We measure validity of model using Convergent Validity by utilizing Average Variance Extracted (AVE). For ensuring our model reliability, we used two variables: Composite Reliability (CR) and outer loading. All of CR score is greater than threshold 0.7, hence our model is fulfill internal consistent reliability. Complete AVE score can be seen in Table 5.

Table 5. Loading Factor Gadget Addiction

Variable	Indicator	Loading Factor	AVE	CR
Time (H1)	Q1	0.777	0.642	0.878
	Q2	0.831		
	Q5	0.782		
	Q6	0.815		
Relationship (H2)	Q3	0.922	0.780	0.914
	Q4	0.892		
	Q13	0.834		
Productivity (H3)	Q7	0.693	0.623	0.814
	Q8	0.782		
	Q14	0.666		
	Q15	0.746		
Though (H4)	Q9	0.666	0.688	0.849
	Q10	0.709		
	Q11	0.808		
	Q12	0.867		

Similar with social media addiction, discriminant validity is also evaluated. Complete discriminant validity can be seen in Table 6.

Table 6. Discriminant Validity Gadget Addiction

	Productivity	Relationship	Thought	Time
Productivity	0.702			
Relationship	0.438	0.883		
Thought	0.469	0.722	0.767	
Time	0.566	0.549	0.609	0.802

For the last step, structural test using Structural Equation Modelling is performed to test hypothesis model. Bootstrap is performed to generate random sampling to our construct. Final result can be seen as follow:

Table 7. Bootstrapping Gadget Addiction

Hypothesis	Path Coef	Sample Mean	STDEV	t	Sig
H1 → AMSG	0.119	0.117	0.091	1.13	*
H2 → AMSG	0.405	0.404	0.093	4.365	*
H3 → AMSG	0.346	0.355	0.15	2.773	*
H4 → AMSG	**-0.078**	**-0.072**	**0.111**	**0.700**	**NS**

Based on computational using SEM techniques, hypothesis H4 (Though) is rejected because it did not meet t > 1.972 with significant level 0.01, 0.05 or 0.1. Other hypothesis, based on result, factors that influence gadget addiction of adolescent in Indonesia are H1 (Time), H2 (Relationship), and H3 (Productivity).

Discussion

From 1782 returned questionnaire, 1397 data is omitted and remaining 385 data because of several reasons: (1) the audience is not fulfilled desire target (age, occupation). We omit occupation like civil servant, workers and others. we merely select student as audience. (2) the audience fill questionnaire multiple time, (3) the audience is not consistent with the answer. This filtering result is produced from L1 feature selection. Based on analysis of data, H4 (Thought) is rejected because is not significantly affected social media and gadget addiction. The reason of rejected as follow: (1) defensive and confidential thought sometimes is not significantly affected to social media and gadget addiction, it could be because someone needs privacy on using his gadget or social media, (2) social media and gadget sometimes did not provide well information, hence the user can think negatively when accessing social media and gadget. H1 (Time) is accepted as factor of influencing social media and gadget addiction because when someone abandoned real-life activity and tend to use more social media and gadget, it can be categorized as addiction, resulting to spend much time in using gadget and social media. H2 (Relationship) is accepted as factor of influencing social media and gadget addiction because sometimes the using of exaggerate social media and gadget in daily activities is influenced by colleagues or friends. H3 (Productivity) is accepted as factor of influencing social media and gadget addiction because sometimes when people unemployed, they tend to use their gadget or social media more than employed people hence resulting to addiction.

Conclusion

Social Media and Gadget addiction not only have positive impact but also have negative impact like mental or behavior problem, as well as decrease of academic motivation. Hence the requirement of knowing factors of social media and gadget addiction of adolescent in Indonesia is required in order to prevent addiction of social media and gadget. We investigate influencing factors of social media and gadget addiction by constructing Partial Least Square and Structural Equation Modeling. The result, Time, Productivity and Relation are the factors of influencing social media and gadget addiction, meanwhile Thought is not the factor of influencing social media and gadget addiction.

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Appendix: Measurement

Code	Item	Loading Factor
H1		0.78
Q1	How often did you use gadget or social media?	
Q2	How often did you abandon daily activity or homeworks?	
Q5	How often did your friends or collegues protest to you for spending much time in using social media or gadget?	
Q6	How often did social media or gadget disturbt your school works	
H2		0.81
Q3	How often did you choose social media or gadget then communicate with family or collegues?	
Q4	How often did you build new relationship with other users?	
Q13	How often did you anger to your collegues if they disturb you to access social media and gadget	
H3		0.68
Q7	How often did you productivity disturbed because of social media or gadget?	
Q8	How often did you check social media or gadget before done your tasks?	
Q14	How often did you sleepless because of social media or gadget?	
Q15	How often did you think about social media or gadget when you did not use it?	
H4		0.69
Q9	How often did you defensive or confidential when you access social media or gadget?	
Q10	How often did you think negatively when you access social media or gadget?	
Q11	How often did you refuse something when you access social media or gadget?	
Q12	How often did you think without social media or gadget is boring?	
Addiction		0.72
Q16	How often did you find yourself busy in social media or gadget?	
Q17	How often did you try to reduce your time in using social media or gadget?	
Q18	How often did you try to hide yourself silent in using social media or gadget?	
Q19	How often did you prefer to use social media or gadget then socialize with person?	
Q20	How often did you fill presure or nervous without gadget or social media?	

Utilization of the Business Process Maturity Model as a Proposed Architectural Planning of Business Model Concept

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Abstract

This research is a part of previous research that succeeded in producing business model architecture planning, the purpose of this study was to develop previous research using the measurement method of business model maturity as a proposed business model architecture planning concept. By taking the same case study theme as the Tiara Payung Putra (TPP) company. TPP is known as a distributor company in cooperation with Pertamina (Bulk LPG Freight and Filling Station). TPP's main business activity is distributing goods in the form of LPG to 76 bases spread across Balaraja district. The current condition of the business model architecture illustrates the business activities that exist in the TPP. The main problems that occur in TPP are not integrating external systems with internal business activities in the company, and lack of IT resource support. For this reason, the Business Process Maturity Model is needed as a benchmark, which can be proposed as a business architecture planning concept. The business process maturity model process is supported by data validation obtained through respondents, namely business stakeholders in TPP, the process for validating the data by distributing the Assessment questionnaire consisting of 8 Parts the Business Process Assessment model, and 3 Parts for IT Application Readiness Assessment. support of the Enterprise Architecture Planning (EAP) Framework method which focuses on the business model architecture domain. The architecture of the business model illustrates how TPP carries out business activities and functions to achieve its objectives. The results of this study produce the proposed business model architecture planning concept in the form of Business Model Maturity Level Measurement, the IS / IT architecture concept, and the Business Architecture Planning roadmap, which are beneficial for the Tiara Payung Putra (TPP) company for the business model architectural planning.

Keywords: Business Process Maturity Model (BPMM), Planning, Business Architecture, Enterprise

Introduction

Enterprise Architecture Framework (EAF) is a framework used to describe and describe the scope of a collection of architectures. In this framework the relationship between architecture is described. The relationship between architecture and the complete picture will accelerate the process of architectural development (Wahyu and Firmansyah 2018).

Enterprise architecture is a tool used to build the alignment of business strategies with information technology, which provides a systematic approach to managing system assets and information and directs strategic business needs with planning and portfolio management that is appropriate for capturing information needs when changes in the business environment occur (Anggrainingsih et al. 2016). The business architecture describes the current state of the company's business by determining the business model or business activity. This architecture will be the basis for designing the architectural phase of IS / IT. The objective to be achieved in this phase is to describe how the company carries out business activities and functions to achieve the company's objectives, so that it can become the foundation for making architectural plans by outlining the gap analysis.

Tiara Payung Putra (TPP) is a company which operates as a LPG Distributor in cooperation with Pertamina's Bulk LPG Filling and Filling Station. The company is located in the West Balaraja area, has 10 trucks and 76 agents spread across the Balaraja district.
The problems that occur in TPP business activities are as follows :
a) Currently TPP does not yet have an enterprise business model architecture that can be used as a reference in business activities.
b) The absence of IT resources, namely IT users who influence the development of the use of Information Technology in the long run that can provide added value for business people.
c) The concept of the business model currently used for LPG distribution is done by computerization using Excel and Word which functions as a supporting tool for data management, and the process is not integrated with the external system as a whole.
d) No integration of the external system with internal business activities in the TPP
   in this issue, the concept of business architecture planning can be done by measuring the maturity level of the business model in TPP, in a previous study (Gandhi 2017) "The way to assess the level of business process management in a company is by the Business Process Maturity Model. BPMM measurements will be carried out in various fields companies related to business process practices "The functions related to use in previous studies are (GARINI 2017)" BPMM is used as a facility to measure business process management in companies so that it can be used as an improvement in achieving success "for that before planning a business architecture, it is necessary to measure position business model in TPP.

Contributing to previous research (Marini and Sarwindah 2019) "Successful business architecture design proposals are produced that can integrate key business activities. This also shows that Business Architecture is one of the key components to determine how well IT has aligned with its business objectives". based on the results of previous studies, the research has been completed and produced a business model that is aligned with IT. so planning a business model architecture, of course, can be useful to assist top-level management in making short-term and long-term decisions, and can enhance competitive advantage that can meet customer needs.

In previous studies, business architecture planning is done by referring to the EA method used, the use of the Enterprise Architecture Planning method focuses on the business architecture domain. By developing research carried out previously, which focuses on the use of Business Model Maturity Level Measurement used as a reference for making architectural planning concepts.
The process of identifying business activities is based on existing business scenarios at TPP. The importance of the Business Architecture is used to map business needs and Information Technology throughout the entire scope of the organization. The purpose of this study can produce a proposed business model architecture planning concept that will benefit Tiara Payung Putra is coming.

Literature Review

Business Process Maturity Model (BPMM)

In assessing the level of maturity of an organization, the maturity model acts as a frame of reference, with which current status is assessed using a model or valuation method (Tarhan et al. 2016).

The main focus of BPMM is on a culture of performance, improvement, and management excellence, and it differs from other models in that it guides the improvement of business process management specifically (Heller and Varney 2013).

Evaluation of organizational practices against the model - the so-called " assessment " is the level at which the organization currently stands. This shows the ability of the organization to execute in the area concerned, and the practices that are the focus of the organization in order to see the greatest improvement and highest return on investment (Version 2011).

Table 1. KPA's BPMM

Level	Focus
Level 5 : Optimization	Proactive Process Improvements (Product & Process Focus)
Level 4 : Quantitatively Managed	Quantitative Management (Product & Process Focus)
Level 3 : Defined	Organization, Process Standardization (Product Focus)
Level 2 : Managed	Work unit, Process management (Product Focus)
Level 1 : Initial	Ad-hoc

Based on Table 1. KPA BPMM: BPMM can be seen from 9 aspects, including strategic views, resolution and documentation processes, assessment and management processes, organizational processes, human management, organizational culture processes, markets, supplier support, and information system support (Muchsam et al. 2011).

Enterprise Architecture Planning (EAP)

Enterprise Architecture (EA) is a framework that was first developed in 1987. EA was built to solve problems related to complex systems and systems that are not in harmony with the business (Wahyu and Firmansyah 2018).

Enterprise Architecture Planning (EAP) is part of the EA framework. this methodology was first coined by Spewak and Hill. Enterprise Architecture Planning EAP is the process of defining the architecture of a company or organization that is useful for supporting business along with planning the implementation of that architecture. EAP is a top two level development method of the Zachman framework (Liana et al. 2019).
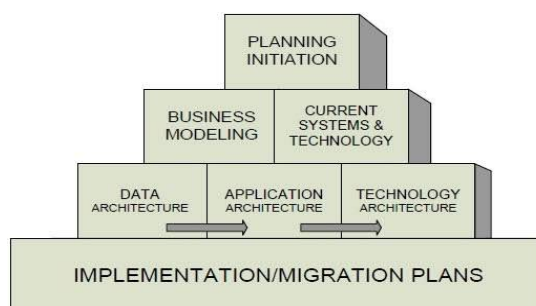
Figure 1. EAP Architecture Layer

Explanation From Figure 1 :

A) Layer 1: Initialization Planning
Planning initiation means determining the pathway for planning the company's architecture, including which methodology is used, who should be involved, and what tools are used. This leads to the production of a work plan for EAP and securing management commitment to go through the next phase (Astri and Gaol 2013).

B) Layer 2: Initializing the Overview of Current Enterprise Conditions
1. Business Process Modeling
The aim of the business model is to provide a complete, comprehensive, consistent knowledge base that can be used to define architecture and implementation plans (Astri and Gaol 2013).
After the business process is defined, the organizational structure of the organizational unit is identified. The function area and its business processes are paired with organizational units, with the aim of identifying the scope of decision making responsibilities and the involvement of each organizational unit in each area of business functions and / or processes (Surendro 2007).
2. Current Systems & Technology
Enterprise that has been running generally has a system and technology. The step in the current state of the analysis phase is to document and define all the systems and technologies that are being used. The documentation is referred to as the Information Resource Catalog (Surendro 2007).

C) Layer 3: Initialize Enterprise Plan Review
1. Data Architecture
Data Architecture identifies and defines the main types of data that support business functions that are defined in the business model. Data architecture consists of data entities, each of which has attributes and relationships with other data entities (Astri and Gaol 2013).
Examples of data architecture in the input process are function definitions, information source forms, sample information sources, interview notes, systems and files that have descriptions, data architecture or other database designs. The process of defining each main data entity and supporting functions, creating Entity Relationship Diagrams for each function, mapping data entities to business functions, defining Information Architecture. Output: List of entities according to business function and each ERD function (Astri and Gaol 2013).
2. Application Architecture
The purpose of the application architecture is to determine the main types of applications needed to manage data and support business enterprise functions. The application architecture is not a design for the system, nor is it a detailed requirements analysis. This is the application definition of what will be done to manage data and provide information to people doing business functions. Input: list of candidate applications, specify applications and connect applications to functions. Process: determine the list of candidate applications, application descriptions, analysis of the impact on the current application. Output: new list of applications (Astri and Gaol 2013).
3. Technology Architecture
The purpose of a technology architecture is to determine the main types of technology needed to provide an environment for applications that manage data. This is the definition of a type of technology - referred to as a platform - that will support businesses with a shared data platform providing a means to collect data from any business unit. Input: list of application candidates, technology platforms. Process: identifying technology platforms and principles, defining platforms and distributions, connecting technology platforms with business applications and functions, distributing technology architectures. Output: technological architecture (Astri and Gaol 2013).
D) Layer 4: Initialization of the Implementation Plan

Implementation of enterprise architecture is done to produce the concept of information systems architecture and technology architecture. The EAP approach suggests that the sequence of processes is carried out using an architecture roadmap (Surendro 2007).

Framework of Thinking

The concept of the framework of thinking made modifies the concept in the EAP framework, by creating a framework that is continuous from the process architectural planning (Business Process Model Assessment) to the proposed recommendations of the business architecture concept, each of which influences the process for modeling business architecture concepts at Tiara Payung Putra (TPP).
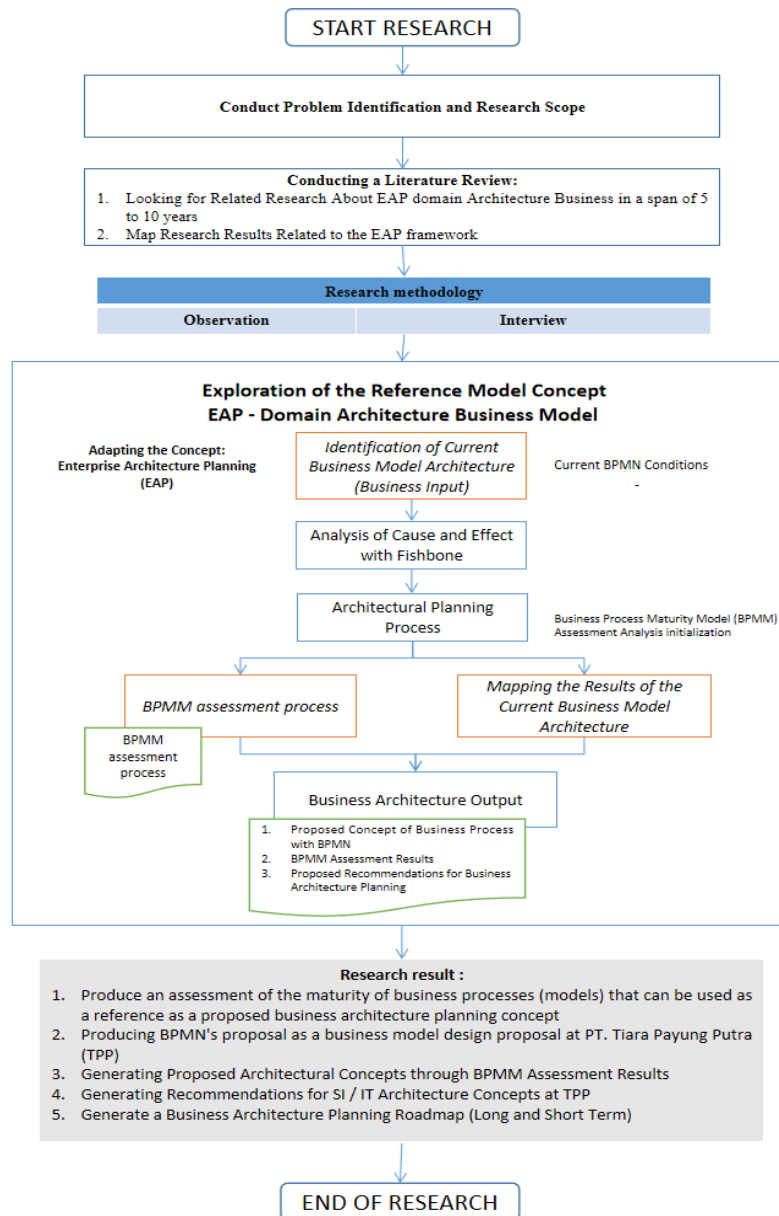

Figure 2. Framework Of Thinking

Explanation From Figure 2 :

The EAP (Enterprise Architecture Planning) Thinking Framework used focuses on the Domain Architecture Model Business at Tiara Payung Putra Company. This architecture defines the outline of the stages of business architecture that is Identification of Current Business Model Architecture,

Analysis of Cause and Effect with Fishbone, Architectural Planning Process, BPMM assessment process (Define BPMM assessment process), Mapping the Results of the Current Business Model Architecture and Business Architecture Output (Proposed Concept of Business Process with BPMN, BPMM Assessment Results, & Proposed Recommendations for Business Architecture Planning).

Research Methodology

This research methodology focuses on the EAP framework. In Figure 3. below explains the contribution of research related to the theory used in the architectural planning process, referring to the EAP framework with the support of some analytical methods. The analysis method is useful as a benchmark for making business model architecture. The final result of this research is to propose recommendations for making business model architecture in TPP.
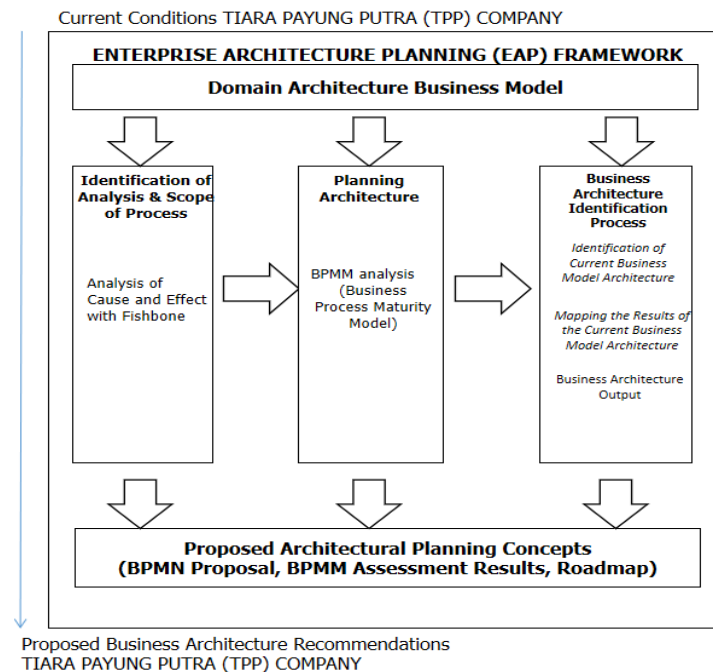
Figure 3. Research Diagram

Explanation From Figure 3 :

In the picture above explains the research contribution related to the theory used in the architectural planning process, referring to the EAP framework with the support of some analytical methods. The analysis method is useful as a benchmark for making business model architecture. The final result of this research is to propose the concept of a proposed business model architecture in TPP.

Research Results and Discussion

In this section the discussion will be carried out in accordance with the research framework that is used as a reference, the following are the stages of research results :

Data Collection Techniques

The technique of collecting data on the research process used to achieve the objectives formulated in the study is as follows :
A) Observation

Observations This research was conducted to determine the current business model and the data / information needed, for that observation was conducted at Tiara Payung Putra (TPP) Company.

B) Interview

In this interview method, researchers conducted interviews with employees, Managers and Directors of the Tiara Payung Putra company, asking related questions.

C) Literature Review

Literature Review is carried out using sources such as National / International Journals with a range of at least 5 years and a maximum of 10 years,

D) Expert Judgement

Validation is carried out and tested by (expert judgment) or expert judgment according to the field, while the stakeholders taken to become expert judgments are the PIC Support Head, Warehouse Manager and Financial Administration Manager.

Identification of Current Business Model Architecture

Identification The current business model architecture is the stage for identifying the business processes currently on TPP.

A. Process of LPG Gas Requests to Pertamina

TPP Conducts LPG gas Requests by attaching an email schedule agreement (PO) containing the plan for the realization of gas distribution to the base, if the data is suitable, it will be sent to Pertamina's, if it is not suitable, revision data will be revised.

B. Process Order Requests Through Agents To TPP

Agent / Base in collaboration with Tiara Payung Putra (TPP), Can Request LPG gas (Subsidies / Non-Subsidies) by Phone, then TPP Receives LPG Gas Requests Via Telephone. The admin section checks the availability of LPG gas through the General Ledger. If available, make a PO Order for LPG gas and plan for the realization of gas distribution to the agent / base (Telephone Confirmation).

C. Process of Stock Inventory Entering from Pertamina to TPP

Letter of Delivery for LPG gas delivery for later checking and recording of LPG gas stock (subsidized/non-subsidized). If in accordance with Realization Plans, TPP Warehouse records according to Stock Availability in books and copies to excel data, if it is not the same, the delivery complaint is not appropriate by sending an email to Pertamina's, with a Maximum Wait of 14 Days.

D. Stock Process Out of TPP

TPP Receives LPG Gas Requests (Subsidized / Non-Subsidized), carried out checking at the warehouse, if not available then PO pending, Waiting for Confirmation within H + 1 Maximum H + 7. if available, LPG Gas Stock Confirmation is available. The administrative division of TPP prepares PO Letters for LPG gas orders and plans for the realization of gas distribution to agents / bases (Telephone Confirmation). Once it is okay, a delivery letter and LPG road letter are made, which is then given to the courier.

Analysis of Effects With Fishbone

Analysis of Cause and Effect with Fishbone, namely Analysis conducted by determining the cause and effect of the existing business model at Tiara Payung Putra, the following is in figure 4. below :
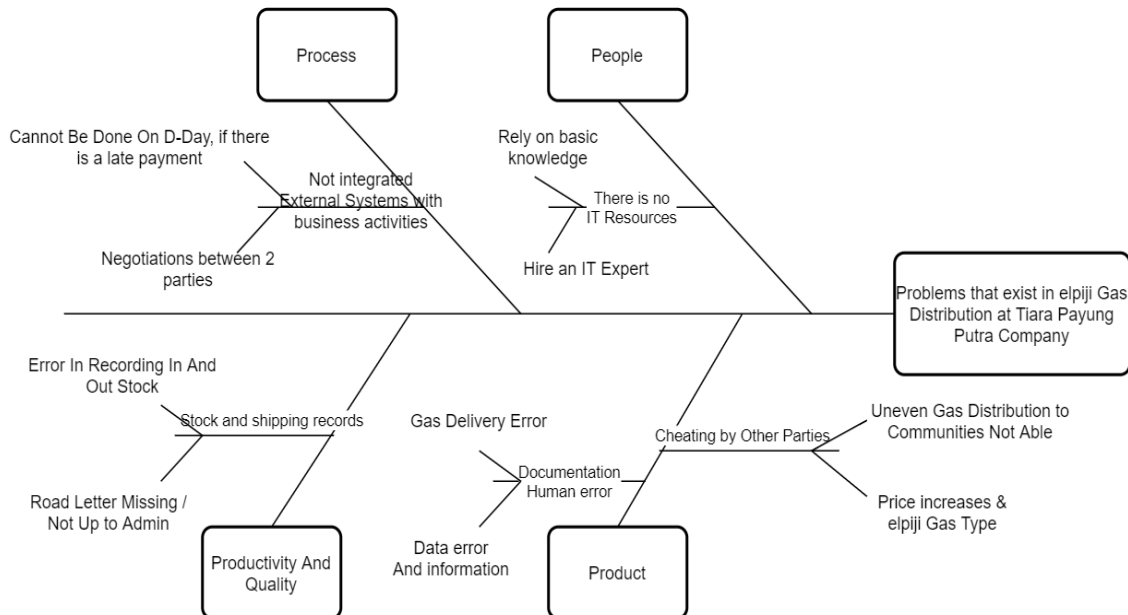
Figure 4. Analysis of Cause and Effect with Fishbone

Explanation From Figure 4 : This causal analysis describes the problems that occur in the distribution of LPG in Tiara Payung Putra. Includes fishbone diagrams with the concept of 4P (People, Process, Product and Productivity Quantity).

Architectural Planning

Architectural planning contains the definition of the Business Process Maturity Model (BPMM) Process Assessment, and the BPMM criteria.

A) BPMM Assessment Process

Component to be able to assess the ability of a particular organization. As that capability develops, the company can develop through the second dimension of the model; that is, Process Maturity Status (Fisher 2004). this section will explain the BPMM assessment process by describing the description of the number of assessments and the total assessments that will be validated by respondents. The following will be explained in Table 2. the BPMM assessment process :

Table 2. BPMM assessment process

Name of Assessment	Amount	Unit	Total Assessment
Business Process Assessment (Model)			
1) Value of Strategic View Areas	5	Question	
2) Process Area Values Definition & Documentation	7	Question	
3) Value of the Measurement & Management Process Area	7	Question	
4) Value of Organizational Process Structure Area	7	Question	47 Question
5) The Value of the Human Management Area	5	Question	
6) Values of Organizational Culture Process Areas	6	Question	
7) Value of Market Orientation Area	7	Question	
8) Supplier's Viewpoint Values	3	Question	

Name of Assessment	Amount	Unit	Total Assessment
IT Application Readiness			
9) Application Viewport Value	7	Question	
10) Value of Infrastructure View Area	5	Question	18 Pertanyaan
11) The Value of View of Information Technology Resources	6	Question	

Mapping the Results of the Current Business Model Architecture

Based on the problems that occur mapping will be done, by identifying current changes, the results of the analysis, and architectural targets. Mapping a gap analysis will produce a solution. As for the analysis of business architecture gaps can be seen in Table 3. below:

Table 3. Gap Analysis And Target Architecture

Current gaps	Analysis Results	Arsitektur Target
No external system integration with internal business activities in Tiara Payung Putra (TPP)	- Delivery cannot be done if there is no direct communication and payment notification.	The Internal Information System Integrated with external Pertamina's business was carried out.
Computerization using Excel and Word, with a level of loss & buildup of documents that are very likely to be found by human error.	- LPG gas that is sent often has errors in delivery, especially in the provision of registration of road letters and plans for the realization of LPG distribution from TPP to the base. - The recording of LPG gas stock in warehouses is not the same as the data in Pertamina's external system.	Performed making Information Systems: 1) Inventory Control Management Information System 2) Distribution Monitoring System
Lack of IT resources to support business process activities at Tiara Payung Putra (TPP).	- Rely on basic knowledge about IT through internet media in every business process. - Hire IT experts for maintenance operations such as hardware and software.	Adding IT organizational structure and recruitment of IT resources that are reliable and able to align IT and Business readiness.

Business Architecture Output

Business Architecture Output is the result of research, in this section describes the process of BPMM assessment results :

a)   Data acquisition of respondents is primary data or data obtained directly through by *Google Forms*, data is filled out by distributing questionnaires directly to research respondents through the *Google Form link.* Questionnaires that have been filled out by respondents are then tested for validity to ensure that the questions given are valid. The number of respondents is described in table 4. & 5. below :

Table 4. Types of Research Respondents

Types of Research Respondents	Number of Respondents	Total Number of Respondents
Male	14	25
Female	9	

Table 5. Results of Research Respondents

Position of Respondent	Number of Respondents
Management (Director / Deputy Director)	1
Head of Responsibility (PIC)	3
Manager	5
Staff	14
Total	**25**

b)   Based on the questionnaire that was filled in by the respondent, a validity test was then carried out to ensure that the questions given were valid. The following results of the respondents' assessment are described in table 6. below :

Table 6. BPMM Assessment Results

Name Of assessment	Total	Name of Mapping Assessment	Average Results
Business Process Assessment (Model)			
1) Value of Strategic View Areas	1.78	**Business Process Readiness (Model)**	1.58
2) Process Area Values Definition & Documentation	1.90		
3) Value of the Measurement & Management Process Area	1.82		
4) Value of Organizational Process Structure Area	1.76		
5) The Value of the Human Management Area	1.69		
6) Values of Organizational Culture Process Areas	1.76		
7) Value of Market Orientation Area	1.73		
8) Supplier's Viewpoint Values	1.84		
IT Application Readiness			
9) Application Viewport Value	1.53	**IT Application Readiness**	1.29
10) Value of Infrastructure View Area	1.87		
11) The Value of the View of Information Technology Resources	1.69		
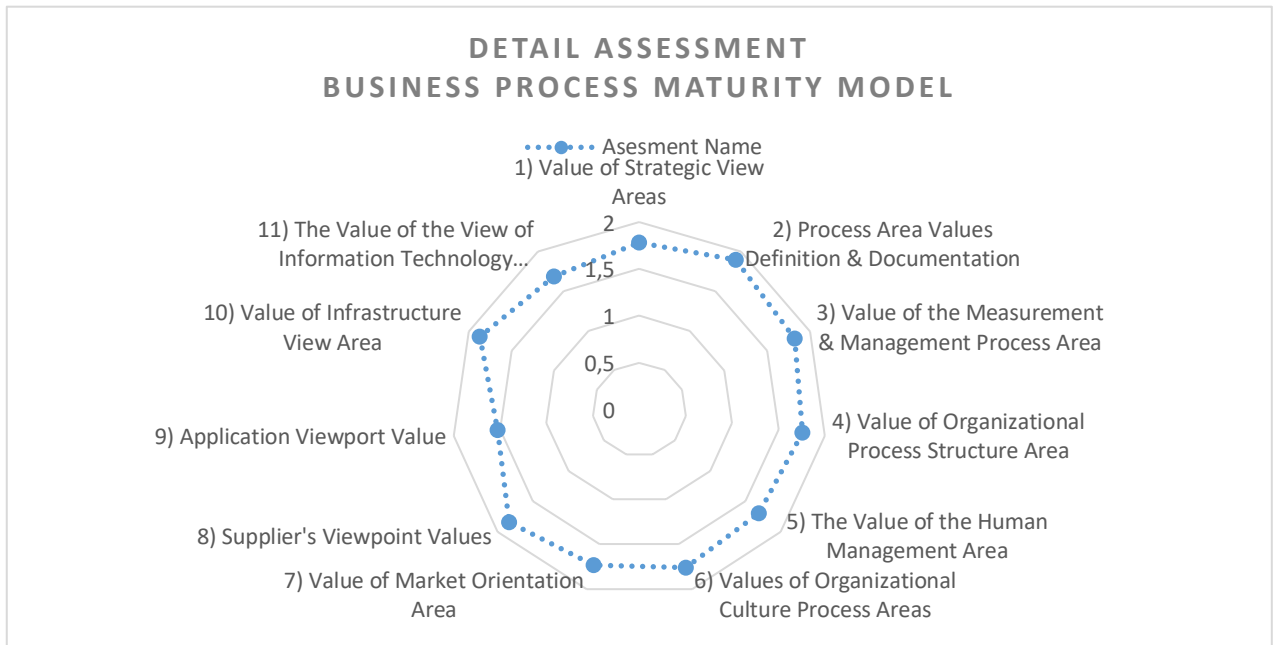
Figure 5. Detail Assessment BPMM
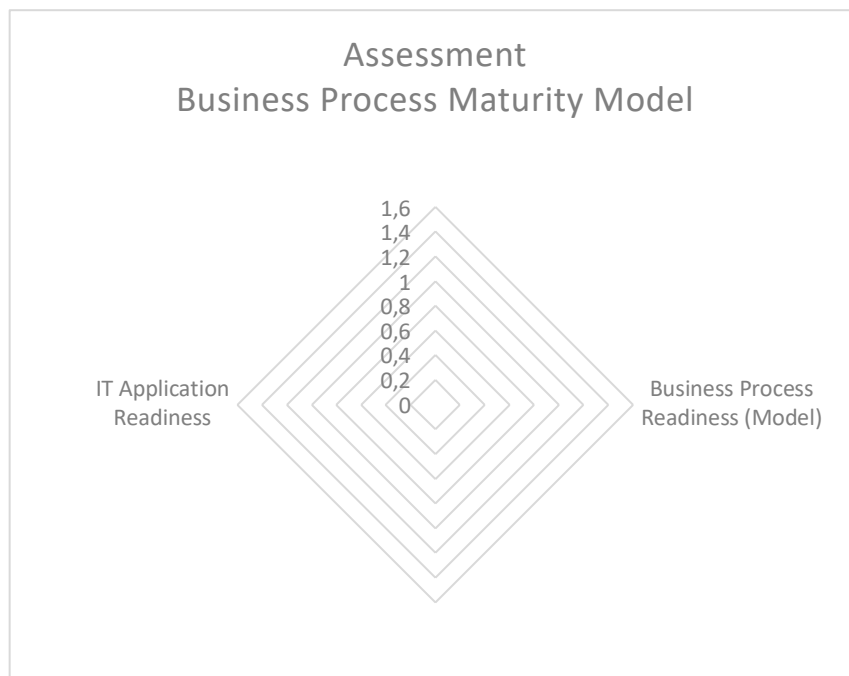
Figure 6. Result Assessment BPMM

Explanation From Figure 5 & 6 : Conclusion of respondent data retrieval. This figure has a different value from the readiness of IT applications so that business alignment with the use of IT at Tiara Payung Putra has not been implemented optimally. Therefore recommendations will be made based on the results of the assessment in the form of a business model architecture planning proposal. The following are the results of the recommendations made, explained in the form of table 7. below :

Table 7. Proposed Architectural Concepts

Level Name	Description	Target Improvement
Current Business Model (Level 1 : Initials)	Ad-hoc	There Is Already A Business Activity But IT Has Not Been Run To The Maximum

Level Name	Description	Target Improvement
Proposed Recommendations (Level 2 : Managed)	Improvement of IT Management and Support Work Unit	1. Improved Organizational Business Activities 2. LPG Distribution & Monitoring 3. Measurement & Analysis of Business Activities 4. Management of IT resources

in table 7 are the results of the proposed business architecture concept recommendations, which are obtained after the data has been processed.

Proposed Recommendations for Business Architecture Planning

Based on the results of the research analysis and the results of the assessment that has been carried out, the following are the proposed business architecture concepts which are explained in Table 8. The business roadmap below :

Table 8. Roadmap for Proposed Architectural Plan Concepts

Architectural Proposed Category	Description	Target
Information Technology Architecture	IT Staff Recruitment	Recruit competent IT staff who are able to understand and manage Infrastructure and Information Technology at Tiara Payung Putra Company.
Information Technology Architecture	IT and Infrastructure	Have adequate IT resources that are supported by good infrastructure
Information Technology Architecture	IT Service Provision Planning	The plan to provide IT services must be supported by adequate resources such as: IT Users (People Who Have IT Knowledge), Software, Hardware and other supporting applications.
Information Systems Architecture	Information System Development Plan	Make an information system development plan, as for the system needed is as follows: a) Financial Management Information System b) Human Resource Information System (HRIS) c) IT Help Desk Service Application d) Inventory Control Management Information System e) Supply Chain Management System (SCMS) f) Customer Relationship Management (CRM)
Business Architecture and Information Technology	IT Management and Infrastructure	IT and infrastructure are integrated as a whole to business activities.
Business Architecture, Information Systems & Information Technology	Organization of Innovation and Application of IT Processes	Managed organizational processes so as to produce innovations such as policies, procedures, management and so forth, so that the application of IT processes can be applied as a whole.

Research Implications

Based on the results of research conducted shows that the use of business process maturity models can be used to measure company level. From this level of business maturity model, it can be proposed making business model architecture using the Enterprise Architecture Planning (EAP) method. the research implications are proven by the validation of data from business stakeholders in the TPP by producing a business architecture roadmap.

Conclusions

Based on the analysis that has been done, the final conclusions of this study are:

1. Based on the validation of the data obtained from the research data of respondents, the results obtained that the process of business process maturity model (BPMM) was successfully carried out and can be used as recommendations for business model architecture.
2. problem mapping in this research is done by Generating Business Architecture Targets obtained based on problem analysis and the gap analysis process.
3. This research results in a business mapping for the Proposed Architectural Plan Concept (Long and Short Term).
4. Research implications result in the utilization of business process maturity model methods that can be used as business model architecture planning, by producing a business plan roadmap.

Acknowledgements

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The Effects of Perceived Justice and Emotions on Service Recovery Satisfaction on Indonesian B2B and C2C E-commerce Customers

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Abstract

This study aims to analyze the effects of justice theory and emotions on service recovery satisfaction of Indonesian e-commerce customers. The factors used in this study are distributive justice, procedural justice, interactional justice, as cognitive aspect. Positive emotions and negative emotions are the factors used as affective aspect. This study used quantitative approach in the form of online survey. The total amount of data used in this study are 601 data. The respondents are Indonesian B2C or C2C e-commerce customer who filed a complaint directly to the B2C or C2C e-commerce at least once and receives a response at least once. Covariance-based structural equation modelling is used to analyze the data. The analysis results show that distributive justice, procedural justice, interactional justice, and positive emotions affect service recovery satisfaction. The results of this study can help Indonesian B2C & C2C e-commerce to understand service recovery from the perspective of customers, so satisfactory service recovery can be implemented.

Keywords: Service recovery, service recovery satisfaction, B2C e-commerce, C2C e-commerce, complaint handling, service failure

Introduction

Based on data collected by Statista in 2016, Indonesia ranks first among ASEAN countries with sales of retail products through e-commerce of $ 5.29 billion US dollars. The competition between e-commerce is fierce. Customers spoiled by various attractive offers made by e-commerce platforms. According to Katadata, Tokopedia became the leader of Indonesia's e-commerce industry with 153.6 million visitors per month, followed by Bukalapak (95.9 million) and Shopee (38.9 million) (Katadata, 2018). Due to the fierce competition between e-commerce platforms, getting new customers and maintaining existing customers become a more difficult task (Swaid & Wigand (2009) in Liao *et al.*, (2017). It becomes even worse due to customers' low loyalty to e-commerce platforms (Liao *et al.*,

2017). Thus, in order to survive, e-commerce platforms should pay attention to factors that may improve customers' loyalty.

According to Priambada (2016), there are three main expectations of customers for the improvement of e-commerce in Indonesia, namely an increase in promos / discounts, an increase in product quality, and an increase in customer service responsiveness. This finding is also supported by research conducted by DailySocial in 2016 which found that responsive customer service is one of the determining factors for customer satisfaction (Priambada, 2016). However, 40.67% of respondents are still experience problems when using e-commerce services (Priambada, 2016). Based on YLKI data in 2017, most of complaints are made due to the slow response in handling customers' complaints (44%), slow products delivery (36%), and problematic refunds (17%) (Bayu, 2018). When dealing with problems, good service recovery can build dedication and trust between customers and e-commerce platforms, which increases customer satisfaction and loyalty (Ozuem *et al.*, 2017). This finding is also supported by Harris et al. (2006) and Maxham (2001) that found that effective service recovery strategies can increase customer satisfaction, repurchase intention, positive word-of-mouth, and stronger corporate image (Yeoh *et al.*, 2014). Conversely, failure to correct customer problems can cause customers to move to competitors, or worse, spread negative word-of-mouth that harms the service provider (Yeoh *et al.*, 2014; Ozuem *et al.*, 2017).

Several studies have been conducted to determine the factors that influence service recovery satisfaction by using justice theory as a cognitive and emotional aspect as an affective aspect, namely in the aviation industry conducted by Wen and Chi (2013) and Nikbin and Hyun (2015), on B2C e-commerce conducted by Urueña and Hidalgo (2016), and at higher education institutions conducted by Waqas, Ali and Khan (2014). Wen and Chi (2013) argues that justice theory has become a strong theory to be the basis of service recovery satisfaction research.

Of the five studies, there is no research that aims to determine the effect of justice theory and emotions on e-commerce customers in Indonesia. In addition, most of the previous studies still focused on service recovery satisfaction in the offline context. Research conducted by Urueña and Hidalgo (2016) on B2C e-commerce also has not tested each dimension of justice theory to other factors such as positive emotions and negative emotions. In addition, it was also found that there have been no previous studies related to service recovery satisfaction in B2C & C2C e-commerce customers as well. Thus, this research tries to fill the research gap by to conduct research on service recovery satisfaction in Indonesian e-commerce customers, especially B2C as well as C2C e-commerce because e-commerce with this business model in Indonesia is very popular.

Literature Review

Service Failure

Even the best companies have difficulty avoiding mistakes while serving customers (Wen and Chi, 2013). This error is also called a service failure. According to Smith, Bolton, & Wagner (1999) in Wong, Newton and Newton (2016), service failure occurs when the service received by a customer does not match customer expectations. Pizzutti and Fernandes (2010) classifies service failures in e-commerce into two categories, namely process failure and outcome failure. Process failure consists of late delivery, information that is incompatible with the product received (bad information), problems with the system / website, and problems with customer service (Pizzutti and Fernandes, 2010). Whereas, outcome failure consists of incorrect billing, incorrect products, defective products, and products have never been received (Pizzutti and Fernandes, 2010). This is supported by Urueña and Hidalgo (2016) that found that the three main reasons for B2C e-commerce customers to file complaints are shipping problems, damaged / defective products, and receiving the wrong product.

Service Recovery Satisfaction

To correct service failures experienced by customers, companies usually perform service recovery procedures. Neira & Casielles (2010) in Waqas, Ali and Khan (2014) said that service recovery is a series of activities carried out to repair and compensate customers for service failures that aims to maintain companies' credibility and recover customers' satisfaction (Danaher & Mattsson, 1994; Grönroos, 1990; Sparks & McColl-Kennedy, 2001 in Ding and Lii, 2016). Service recovery is often performed in forms of sending apologies and explanations, offering solutions, compensation, or other actions to quickly resolve problems while maintaining a polite and respectful attitude towards customers who submit complaints (Mostafa *et al.*, 2015). Companies should be cautious during service recovery process. Failed to perform a successful service recovery process can harm companies in various ways.

According to Orsingher, Valentini and de Angelis (2010), satisfaction with complaint handling is the customer's evaluation of how well a company handles problems. Meanwhile, according to Huang (2011), service recovery satisfaction is a positive assessment from customers when comparing profits and sacrifices obtained from service failure with consequences obtained from problems (Moliner-Velázquez, Ruiz-Molina and Fayos-Gardó, 2015). Therefore, it can be concluded that service recovery satisfaction is customer satisfaction with the process and results they obtained from the service recovery provided by the company, when compared with initial expectations and sacrifices made by the customer.

Interactional, Procedural, and Distributive Justice

In handling problems faced by customers, companies must also pay attention to aspects of justice to customers. According to Río-Lanza et al., Adam's theory of perceived justice is an appropriate tool for studying individual reactions when performing complaint behavior (del Río-Lanza, Vázquez-Casielles and Díaz-Martín, 2009). In the theory of perceived justice, Adam introduced three dimensions of justice namely interactional justice, procedural justice, and distributive justice.

Distributive justice is defined as a customer's evaluation of the results obtained from filing complaints, and whether the results make sense or not (Waqas, Ali and Khan, 2014). Meanwhile, Wen and Chi (2013) defines distributive justice as the customer's response to what he gets from service recovery. Of course, customers hope that the company can compensate the losses suffered by customers (Wen & Chi, 2013). In addition, customers also expect something 'more' during service recovery, such as an apology, refund, or repair (Wen & Chi, 2013). Then, it can be concluded that distributive justice is the customer's assessment of the output obtained for complaints that he submits, both material (compensation, refunds, etc.) or immaterial (apologies) when compared with the problems experienced and their impact.

Meanwhile, interactional justice is defined by Wen & Chi (2013) as a customer assessment of how service providers and their employees treat customers. Urueña & Hidalgo (2016) defines interactional justice as justice that is received by customers in interactions with company employees during the service recovery process. Customers expect employees to be respectful, caring, honest, and willing to help solve the problems they face (Wen & Chi, 2013). Therefore, in this study, interactional justice is defined as a customer assessment of customer service attitudes in serving customers, which includes sincerity, courtesy, honesty, and empathy.

The last dimension, namely procedural justice, is defined by Wen & Chi (2013) as the customer's opinion on the service recovery process provided, where the company can be held accountable for its mistakes, handle complaints immediately, and resolve problems experienced quickly. Therefore, procedural justice focuses on aspects of accessibility, speed, and flexibility in handling the problems experienced by customers (Nikbin and Hyun, 2015).

Conceptual Model and Hypotheses

Distributive justice and its influence on positive emotion, negative emotion, and service satisfaction recovery

When experiencing service failure, customers certainly expect the company to be able to compensate for the losses they experience (Wen & Chi, 2013). In the theory of distributive justice, customers often expect a solution to the problem that is at least equivalent to the effort and impact caused by the problem. Often, customers also expect something 'more' during service recovery, such as an apology, refund, or repair (Wen & Chi, 2013). The solution of this problem must also offer a fair and profitable solution (Maxham and Netemeyer, 2002), appropriate (Kim & Smith, 2005), and show the efforts of service providers to solve the problem. Customers also want to solve problems that are accompanied by clear reasons (Colquitt, 2001).

Solving problems both materially and immaterially can certainly affect customer emotions, as has been proven in several previous studies. Research conducted by Kim & Tang (2016) on service recovery in restaurants proves that distributive justice is the factor that most influences the emotions felt by customers. This may happen because distributive justice is the most easily assessed and most obvious dimension (Kim and Tang, 2016). Kuo and Wu (2012) found that the ability of service providers to provide distributive justice for example in the form of discounts and refunds can make customers feel happy and satisfied. Conversely, if the company cannot provide fair and appropriate handling of problems, customers can feel negative emotions such as anger and resentment.

In addition, Wen & Chi (2013) said that providing fair solutions can improve customer satisfaction, while the company's failure to provide fair compensation can result in reduced customer satisfaction. Yeoh et al. (2015) who conducted research related to service recovery satisfaction in online shopping found that the most effective strategy to improve service recovery satisfaction was to provide replacement or refund after direct service failure. With the solution to the problem of providing compensation or other solutions that are in accordance with the impact of the problem faced by the customer, this can restore customer satisfaction. Therefore, we proposed the following hypothesis.

> H1: Distributive justice positively influences positive emotions
>
> H2: Distributive justice negatively affects negative emotions
>
> H3: Distributive justice positively affects service recovery satisfaction

Interactional justice and its influence on positive emotion, negative emotion, and service satisfaction recovery

Interactional justice is defined by Urueña & Hidalgo (2016) as the equality that is received by customers when interacts with companies' employees during the service recovery process. Customers expect employees to be respectful, caring, honest, and willing to help solve the problems they face (Wen & Chi, 2013). Therefore, in this study, interactional justice is defined as a customer assessment of customer service attitudes in solving customer problems, which include sincerity, courtesy, honesty, empathy, and efforts to solve problems.

Customers who are treated unfairly by employees during service recovery may feel angry and disappointed (Wen & Chi, 2013). This is also supported by the findings of Mccoll-Kennedy and Sparks (2003) which states that employees who do not serve customers well, especially when facing problems, can cause negative emotions to customers. Conversely, employees who are polite and empathetic will encourage positive emotions in customers (Wen & Chi, 2013). Therefore, social interaction between companies' employees and customers is crucial in determining customer emotions, especially when customers experience service failures.

Waqas, Ali, & Khan (2014) argue that during service failures, customer satisfaction can still be achieved by offering emphatic, sincere and polite behavior while trying to resolve the issues. This is also supported by Yeoh et al. (2015) who found that customer satisfaction would increase if the interaction between customers and online retailers are fill with empathy and friendliness. Thus, during the service

recovery process, online retailers need to submit apologies, respect customers, and provide an appropriate explanation for the service failure (Yeoh et al., 2015). The majority of Indonesian people are friendly, so cold interactions and lack of empathy can reduce customer satisfaction with the service recovery process (Refiana, 2012). Therefore, the authors draw the following hypothesis:

H4: Interactional justice positively influences positive emotions

H5: Interactional justice negatively affects negative emotions

H6: Interactional justice positively affects service recovery satisfaction

Procedural justice and its influence on positive emotion, negative emotion, and service satisfaction recovery

The final dimension of justice theory, namely procedural justice, is defined by Wen & Chi (2013) as the customer's opinion on the service recovery process provided, where the company can be held accountable for its mistakes, handle complaints promptly, and resolve problems quickly. Therefore, procedural justice focuses on procedures for handling problems that have good accessibility, speed, and flexibility in handling problems experienced by customers (Nikbin & Hyun, 2014).

The ability of companies to solve problems quickly with flexible procedures can produce positive emotions in customers and reduce negative emotions such as anger and frustration (Wen & Chi, 2013). This is also supported by research by Nikbin & Hyun (2014) who found that customers feel fewer negative emotions when customers are treated with fair procedures. In addition, procedural justice can also affect the service recovery satisfaction felt by customers (Waqas, Ali, & Khan, 2014). Therefore, the authors proposed hypotheses as follows:

H7: Procedural justice positively influences positive emotions

H8: Procedural justice negatively affects negative emotions

H9: Procedural justice positively affects service recovery satisfaction

Positive emotion and negative emotion as the antecedents of service satisfaction recovery

The results of research conducted by Urueña & Hidalgo (2016) show that positive emotions and negative emotions can affect service recovery satisfaction. Therefore, it is important for companies to train employees to be able to manage customer emotions, especially positive emotions when customers submit complaints. Many customers feel strong emotions when experiencing service failure and during the service recovery process (Wen & Chi, 2013). If these emotions are not controlled, this can lead to customer dissatisfaction (Wen & Chi, 2013). Thus, companies must pay attention to customer emotions that are seen from the tone of speech and phrases (Kuo & Wu, 2012).

In addition, companies must be able to increase customer positive emotions and manage their negative emotions to be able to increase satisfaction (Kuo & Wu, 2012). If the service recovery provided can make customers feel positive emotions such as feeling calm and happy, then the customer can return to the condition of satisfaction despite experiencing service failure. Conversely, if the service recovery provided makes the customer feel negative emotions such as frustration, anger, and disappointment, then this indicates that the recovery service provided does not satisfy the customer. Therefore, the authors formulated the following hypotheses.

H10: Positive emotions affect service recovery satisfaction positively

H11: Negative emotions negatively affect service recovery satisfaction
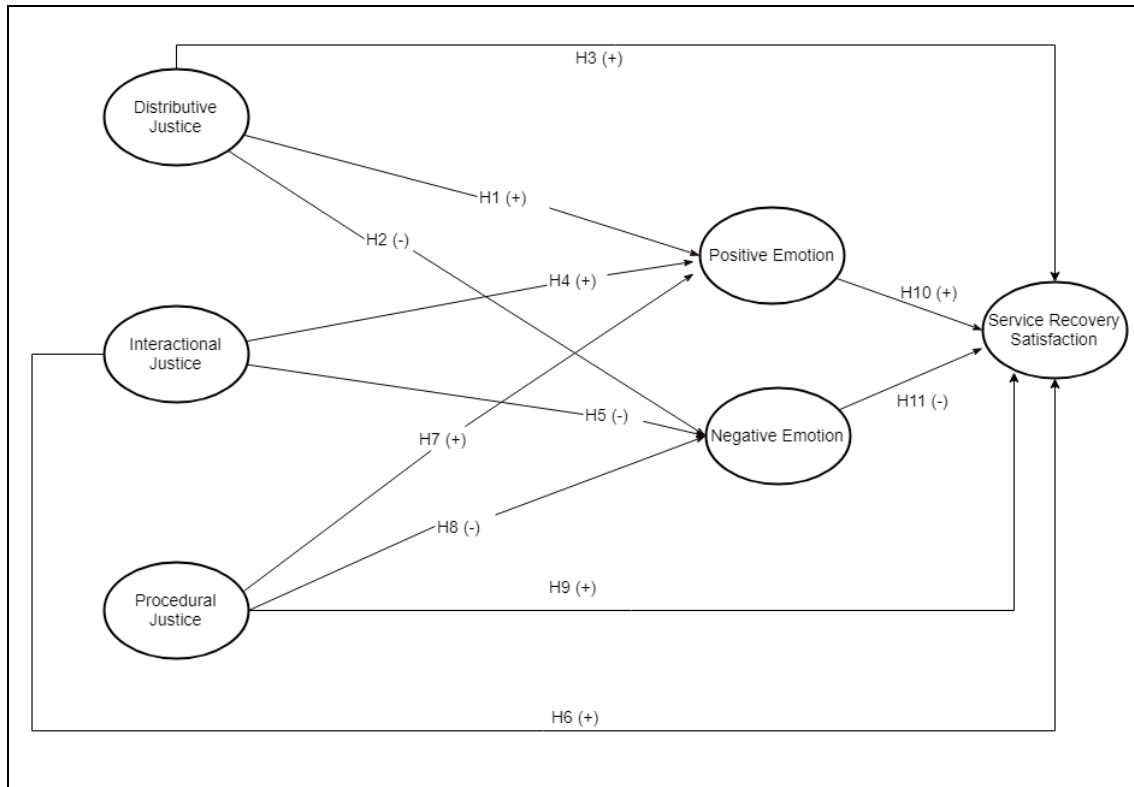
Figure 1. The Proposed Research Model

Research Methodology

Sampling and data collection

The authors conduct the readability test to ensure that the questionnaire can be answered by respondents. 11 respondents from the various background are asked to comment on the initial questionnaire. After completing the readability test, the questionnaire is distributed using an online questionnaire that can be accessed via the link bit.ly/komplainecom2. The author uses social media such as Twitter, Facebook, Instagram, Line, and LinkedIn to facilitate the questionnaires distribution. The data collection technique used by the author is purposive sampling, which is the technique of selecting respondents according to predetermined criteria. The criteria that determine the author in choosing a research sample are B2C or C2C Indonesian e-commerce users (either as sellers or buyers) who have asked for complaints to customer service at least once and received a response at least once from the e-commerce customer service.

Demographics of Respondent

The amount of valid data to be analyzed is 601 data. According to Kline (2016), the number of respondents should be grated that 10 times the research indicators. Since this study uses 26 indicators, the amount of collected data is sufficient to be further analyzed. Table 1 summarizes the demographic characteristics of the respondents.

Table 1. Respondent Demographics

Gender	Men	28.62%
	Women	71.38%
Age	<=20 years	16.81%
	21–30 years	72.88%
	31–40 years	9.82%
	>40 years	0.50%
Education Level	High School	27.45%
	Diploma	9.82%
	Bachelor	59.07%
	Master	3.33%
	Others	0.33%
Monthly income / Allowance (in Thousand Indonesia Rupiah)	< IDR 500	12.81%
	IDR 500 - 1000	10.65%
	IDR 1001 - 5000	50.25%
	IDR 5001 - 10000	22.63%
	> IDR 10000	3.66%
Problems in E-commerce	Problems with the systems	30.62%
	Product does not match the description	25.29%
	Delivery problem	35.61%
	Other Problems	8.49%
Length of time for resolving the problems	Less than a day	21.30%
	1-3 days	49.08%
	4-6 days	8.99%
	1-2 weeks	10.32%
	> 2 weeks	3.16%
	Never resolved	7.15%

Research Results

Measurement Model Evaluation

In order to evaluate the measurement model, we use three type of test that consist of convergent validity, reliability, and discriminant validity tests. In validity testing, we must ensure that the loading factor for each indicator is more than 0.70. Meanwhile, the AVE value must be greater than 0.5 (Santoso, 2015). If the indicator has a loading factor less than 0.7, then the loading factor can be eliminated or set the error variance to 0.01 (Wijanto, 2015). Next, we check whether the value of CR and CA are greater than the cut-off value of 0.7. In addition, the AVE value of each factor must be greater than 0.5. The calculation results show that the CR, CA, and AVE values pass all the cut off value (see Table 2).

Table 2. The Results of CR, CA, AVE and Square Root of AVE

Factors	SRS	DJ	EN	EP	PJ	IJ	CR	CA	AVE
SRS	**0.882**						0.873	0.866	0.777
DJ	0.692	**0.869**					0.858	0.830	0.756
EN	-0.339	-0.347	**0.904**				0.957	0.932	0.817
EP	0.785	0.739	-0.398	**0.911**			0.936	0.964	0.829
PJ	0.668	0.605	-0.343	0.707	**0.872**		0.861	0.880	0.760
IJ	0.772	0.745	-0.435	0.838	0.725	**0.877**	0.952	0.936	0.769

Next, to evaluate the measurement model, we must check the goodness of fit by evaluating the value of CMIN / df, RMSEA, NFI, CFI, GFI, TLI, and RMR. Each of these criteria must pass the predetermined cut-off value to be considered as a fit model. The result of goodness of fit measurement model can be seen in Table 3.

Table 3. The Result of Goodness of Fit Measurement Model

Criteria	*Cut-off value*	Results	Remarks
CMIN/df	< 2.0	1.998	*Good fit*
GFI	≥ 0.9	0.947	*Good fit*
NFI	≥ 0.9	0.975	*Good fit*
CFI	≥ 0.9	0.987	*Good fit*
RMR	≤ 0.05	0.04	*Good fit*
TLI	≥ 0.9	0.983	*Good fit*
RMSEA	≤ 0.08	0.045	*Good fit*

Structural Model Evaluation

After evaluating measurement model, we evaluate the structural model by calculating the R-square value and performing hypothesis testing. R squared value represents the proportion of the variance of a factor explained by the predictor of that factor (Bryne, 2010). Thus, by looking at the R squared value, it can show how far a factor can be explained by their exogen factors. The value of R squared of this model can be seen in Table 4.

The negative emotions factor can be explained by its predictors factor, namely distributive justice, procedural justice, and interactional justice by 17.6%. Meanwhile, the positive emotions factor can be explained by its predictors namely distributive justice, procedural justice, and interactional justice by 75.4%. Lastly, the service recovery satisfaction factor can be explained by its predictors namely distributive justice, procedural justice, interactional justice, positive emotions, and negative emotions by 67.1%.

Table 4. R Squared Value

Factor	R^2 Value
EN	0.176
EP	0.754
SRS	0.671

Next, we perform one tail hypothesis testing to evaluate the proposed hypothesis. A hypothesis will be accepted if its p/2 < 0.05. The result of hypothesis can be seen in Table 5. Among 11 hypotheses, 3 hypotheses are rejected while the rest are accepted.

Table 5. Hypothesis Testing

Hypotheses				P-Value	Result
H1	EP	←	DJ	0.002	Accepted
H2	EN	←	DJ	0.49	Rejected
H3	SRS	←	DJ	0.003	Accepted
H4	EP	←	PJ	0.004	Accepted
H5	EN	←	PJ	0.594	Rejected
H6	SRS	←	PJ	0.019	Accepted
H7	EP	←	IJ	0.002	Accepted
H8	EN	←	IJ	0.004	Accepted
H9	SRS	←	IJ	0.002	Accepted
H10	SRS	←	EP	0.004	Accepted
H11	SRS	←	EN	0.828	Rejected

Discussion

Based on Table 5, distributive justice is proven to positively influence positive emotions. This result is in accordance with research conducted by Kuo & Wu (2012) who examined service recovery satisfaction in online shopping, which said that the ability of service providers to provide distributive justice for example in the form of discounts, refunds, and improving the quality of goods to avoid customers issuing more a lot of costs, will make customers feel positive emotions. Meanwhile, distributive justice is not proven to have a negative influence on negative emotions. These results are consistent with the study of Wen & Chi (2013), which states that customers who experience flight delays do not expect compensation from the airline. Thus, the absence of compensation does not always cause negative emotions to customers (Wen & Chi, 2013). Additionally, we found that there is a positive correlation between distributive justice and service recovery satisfaction. These results are consistent with the study of Wen & Chi (2013) which says that providing fair solutions to compensate for customer losses can increase customer satisfaction with service recovery.

Furthermore, this study shows that there is a positive relationship between procedural justice and positive emotions, where good procedures will increase customers' positive emotions, while procedures that are less good will reduce customer positive emotions. This result is in line with the study of Wen & Chi (2013) which says that solving problems as quickly as possible and flexible procedures can produce positive emotions on customers such as feeling happy and happy. Additionally, there is a positive relationship between interactional justice and negative emotions in Indonesian B2C & C2C e-commerce customers. These results are consistent with previous studies conducted by Wen & Chi (2013), Urueña & Hidalgo (2016), and Nikbin & Hyun (2014). Customers who are treated unfairly will cause negative emotions to customers, such as anger and disappointment (Wen & Chi, 2013). Social interaction with customers is very important in determining customer emotions (Nikbin & Hyun, 2014).

Lastly, this research show that the stronger positive emotions felt by customers, customer satisfaction will increase. Conversely, if positive customer emotions are reduced, then customer satisfaction will also be reduced. These results are in line with research conducted by Urueña & Hidalgo (2016) and Kuo & Wu (2012). According to Kuo & Wu (2012), encouraging positive emotions in customers who submit complaints can increase customer satisfaction.

Conclusion

This study aims to analyze the effect of justice theory and emotions on service recovery satisfaction on Indonesian e-commerce customers. To collect research data, the authors distribute online questionnaires and then evaluate the collected data by using CB SEM approach. Based on the results, it can be concluded that the negative emotions factor is not proven to affect the service recovery satisfaction of Indonesian B2C & C2C e-commerce customers. Meanwhile, distributive justice and procedural justice factors were not proven to affect negative emotions felt by customers because of service recovery performed by B2C & C2C e-commerce in Indonesia. Factors that have been proven to influence positive emotions are the three dimensions of justice, namely procedural justice, distributive justice, and interactional justice. Additionally, interactional justice is the only factor that have been proven to have influence on negative emotions. Lastly, distributive justice, procedural justice, interactional justice, and positive emotions influence service recovery satisfaction. Thus, it can be concluded that the three dimensions of justice are important factors that affect service recovery satisfaction, while the affective aspects that need to be considered to increase customer satisfaction are positive emotions.

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Data Privacy, What Still Need Consideration in Online Application System?

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Abstract

This paper aims to conduct an analysis and exploration of matters that still needs to be considered in relation to data privacy in the online application system. This research is still a preliminary study. We conduct research related to data privacy using systematic literature review approach (SLR). By using SLR stages, we made a synthesis of 44 publications from Scopus Database Online that were released in the range 2015 - 2019. Based on this study, we found six points to consider in data privacy, namely security and data protection, user awareness, risk management, control setting, ethics, and transparency.

Keywords: Data privacy, systematic literature review, personal data, online application system, online system network

Introduction

Data at this time has been considered as a valuable and important asset (Baillie et al. 1994; Reinsel et al. 2018; Tapsell et al. 2018). This is because data can be a basis for strategic business decision making and can also provide insight in finding business opportunities (Reinsel et al. 2018). Data asset here includes data that is personal or data that can be associated or attached to someone (Lopes and Quaresma 2016; Tapsell et al. 2018).

Personal data is now more easily obtained by certain parties with the rise of social media and online application systems such as marketplaces, online transportation, and online loan services (Klukovich et al. 2016; Mostafa et al. 2017). Thus personal data is more prone to be misused (Schuppler et al. 2018; Shabtai et al. 2012). For this reason, there appears an emphasis on the term data privacy in which a person has the right to reject and close information attached to him (Korže and Čertanec 2017).

On the surface of the community it is as if deliberately sharing personal data because they think personal data is safe both on social media and on the online application system they use. In fact, this personal data is often misused by individuals who are traded to those who use it, among others, to examine consumer behavior, influence one's political direction, design political campaigns, to criminal acts such as credit card burglary and extortion (Shabtai et al. 2012).

The importance of protecting personal data is increasingly echoed after the scandal that befell Facebook with the sale of user data to Cambridge Analytica (Isaak and Hanna 2018; Srivastava and Geethakumari 2016). In Indonesia, data stored online is also widely misused, especially in the case of online loans and other cases relating to financial services (Majumdar et al. 2018). The case involving Cambridge Analytica and Facebook in 2018 did shake the world. The complete picture of the case is documented in full in the film "The Great Hack". In the documentary that the use of millions of users' personal data has been going on for years and only then revealed (Livemint 2019). Cases of misuse of personal data of its users apparently also involve Google and Twitter (Curran 2018; TechSpot 2019).

Meanwhile, awareness of personal data has begun to be intensified, including the presence of data privacy days or data protection days commemorated every January 28. The existence of this anniversary encourages awareness of the importance of data protection, including personal data, both by the institution and each individual (Vervier et al. 2017). Awareness of the importance of protecting personal data is widespread. Sharing personal data or vice versa, refusing to share data is privacy for everyone, including in the cyber world.

The important role of personal data is also recognized by the Indonesian government. Moreover, every year there are cases of misuse of personal data reported by the public. In 2019 there was a lot of news about Civil Registry Office's data leaks in the form of residence identification numbers and ID numbers. This data is said to be traded, some are used for extortion, although later the Civil Registry Office's dismissed the issue (Sekretariat Kabinet Republik Indonesia 2019). Based on Legal Aid, there are three thousand reports of data misuse by online lending institutions in Indonesia (Katadata 2019). Not to mention other cases of violations in other places and those that have not been reported. Personal data that are generally misused include telephone numbers, identity cards, ID numbers, and data on credit/banking cards (Hukum Online 2018).

Because we consider data protection to be important, therefore, in this study there is one thing that we want to explore with the explanatory method by taking a systematic literature approach. We ask one question, which is, "What are the things that still need to be considered in the activities of protecting personal data in an online application system, relation to data privacy?" The output of this research is any area that needs to be considered in relation to data privacy, especially with regard to personal data.

Literature Study

What is data privacy? Privacy according to Merriam-Webster is something whose use is intended to be limited to only certain people or groups. In relation to technological developments, the term and scope of privacy are also widespread. Now, privacy is not only about something physical and action, but also in the form of information or data. This privacy data has to do with privacy that is defined by Westin (1967), namely the demands of individuals, groups, or institutions to do and determine their own how, when, and to what extent information about them is communicated to other parties. Seeing from this definition, data privacy is related to access rights and control of information (Mai 2016).

General Data Protection Regulation (GDPR), the regulation of European Union law on data protection and privacy which is often a reference in data privacy and protection of personal data, provides a definition of data privacy as the freedom granted to make their own decisions about who can process data them and for what purpose (GDPR.EU 2019).

The definition of data privacy is generally associated with personal information that can characterize an individual (Mai 2016). The type of data that is of concern in terms of their use or relating to data privacy is personal data. Therefore, privacy data is closely related to personal data. Personal data is defined as all information that has a connection with identity or as natural can identify someone either directly or indirectly (Klosek 2000). This definition is similar to that stated in GDPR, personal data is any information relating to someone that can be identified directly or indirectly (European Parliament and of the Council 2016). Whereas in Indonesia, personal data based on the Population Administration Law is certain personal data that is stored, maintained, and kept truthful and protected by confidentiality (DPR 2006).

Personal data is based on the level of confidentiality and its importance is divided into four, namely insensitive data, sensitive data, quasi-identifiers, and explicit identifiers (Nataraj Venkataramanan 2016). Insensitive data is data that is easily accessed, for example gender. Sensitive data is data that has confidential information about the owner's records, for example health issues, financial status, and income. Whereas Quasi-identifiers are attributes that include demographic, geographical, telephone and e-mail address information. While explicit identifiers are attributes that are attached to someone directly. Examples are name, identity card, insurance ID, and social security number, driver license.

According to GDPR personal data includes names and email addresses, location information, ethnicity, gender, biometric data, religious beliefs, web cookies, and opinions. Pseudonym data can also be entered into personal data if it is relatively easy to identify someone from it (European Parliament and of the Council 2016). Whereas in Indonesia, personal data that is protected under the Population Administration Act includes family card numbers, employment numbers; ID number; date/month/year of birth; information on physical and/or mental disability; parent identification number; and some notes on important events (DPR 2006).

The discovery of the internet caused the issue of data privacy to be important. Especially with the internet access gadget. The internet is referred to as a source of information about individuals (Klosek 2000). This data is collected by the internet through surveys, cookies, pages that need to be registered and so on (Klosek 2000). At this time information is also being collected by various mobile applications embedded in the device. For this reason, protection of personal data is important. GDPR recommends that the personal data be processed legally, fairly and transparently, collected with the stated, explicit and legal purpose. Personal data may only be stored in the long term for archiving and public use, research purposes and statistical purposes (GDPR.EU 2019).

Research relating to personal data has been booming lately in a decade. This is because data privacy is something important related to technological progress. One paper discusses about user's awareness of their personal data in the online system (Hossain and Zhang 2015). They conducted the study by distributing questionnaires to 377 users who were familiar with online social networks (OSN) such as Facebook and Twitter. Based on this research 80 percent considered OSN had not provided adequate privacy controls (Hossain and Zhang 2015). Other studies discuss children's online privacy (Minkus et al. 2015). Some parents volunteered to share their children's data, even if for example the only viewing arrangement was arranged by a close friend. This is risky because crime against children is currently increasing, parents also need to protect their children's personal data (Minkus et al. 2015).

Research Methodology

In this study the author explores anything that still needs to be considered in relation to data privacy and protection of personal data, especially in relation to the online application system. To answer this problem, the authors conducted a series of research stages. This research methodology began with a systematic literature study of the latest research in the realm of computer science about personal data. Systematic literature review (SLR) is a research method that is widely used. This method is generally used in the fields of health and medicine, as well as in science. But later its use expanded, including in the field of computer science. The SLR method is suitable for preliminary research to find out about trends in a particular discipline, to clarify preliminary research, and to identify and interpret the state of the art on a topic (Kitchenham and Brereton 2013).

SLR can also be referred to as a form of secondary study by conducting a series of activities, beginning with the identification, analysis, and interpretation of all the evidence that has been obtained related to certain research questions that are not biased (Kitchenham et al. 2009). The stages can be repeated. This SLR method is suitable for researchers who want to know the current issues raised by researchers in a particular discipline or field, and aim to synthesize, avoid subjectivity, and bias (Kitchenham and Brereton 2013).

We chose to use the SLR approach to find current issues about data privacy. We hope to find a state of the art about research related to data privacy at this time. For this reason, we used the term 'data privacy' when searching using SLRs. We initially found 72,713 documents on Scopus electronic database. This

research began to climb in 2004 with 1.409 publications and continued to grow with 2.184 publications in 2007. Furthermore, research in this field had decreased before then returned to be interesting to study. The topic of privacy data again boomed in 2010 with 2.584 publications, then continued to climb until its peak reached 9.007 in 2019. The trends and figures on privacy data can be seen in the Figure 1.
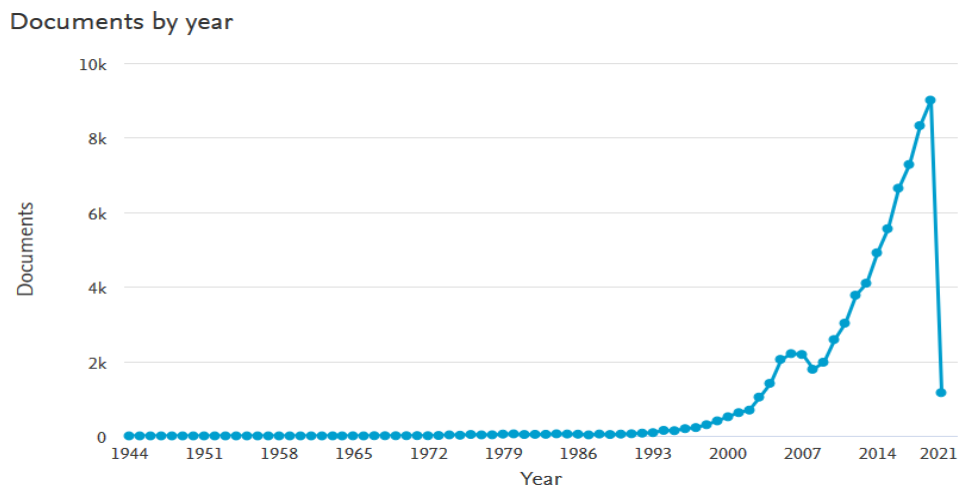
Figure 1. The Number of Publication on Data Privacy in Scopus Based By Year

We then carried out the screening process by providing several criteria and limits. We filtered based on the criteria for inclusion and exclusion as shown in the Table 1. We chose the latest publication, which ranges from 2015 to 2020. We also chose publications that fall into the field of computer science that written in English. We also limited the publication of results to a paper conference or journal. We also made restrictions so that the paper discusses more about the use of data privacy in the online system. From these limits we found 195 publications.

Table 1. Inclusion and Exclusion Criteria in SLR Process

Inclusion Criteria	Exclusion Critera
In the discipline area of Computer Science	Outside of Computer Science
Data privacy in online application system	Not relevant, for example only discuss the meaning of data privacy
2015 – 2020 range	Duplicated publications
Written in English language	Using any language
Type publication are papers, journals, or books review	Publications cannot be accessed by online

We then read the title of publication one by one. But apparently there were still some lecture notes that went into it. From the title screening, we found 141 publication, then we conducted abstract screening. We collected 96 suitable publications from this process. Next, we carried out final screening process by reading in full paper. We found 44 papers, then we made the summary paper one by one, we also did the synthesis and categorization. The stages in this SLR can be seen in the Figure 2.
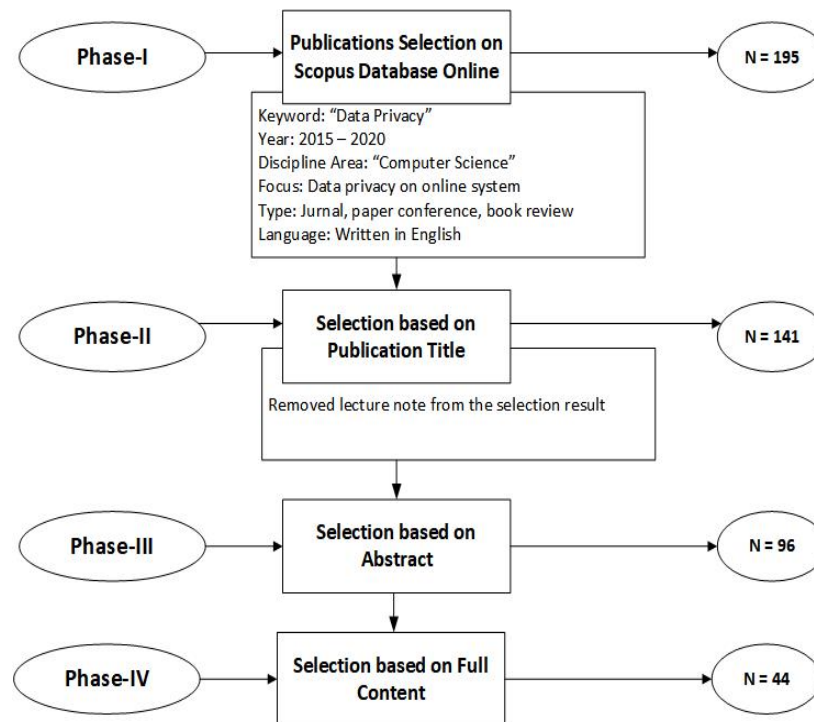
Figure 2. Systematic Literature Review Stages

Result

Of the 44 publications we obtained with the systematic literature review, most of them were conference papers, namely 43 papers and 1 in the form of journals. The average publication was issued in 2016 and 2017, with details: 2015 as many as 6 pieces (13.6%), 2016 consisting of 15 pieces (34.1%), 2017 as many as 16 pieces (36.4%), 2018 consists of 3 units (6.8%), and 2019 consists of 3 publications (6.8%). we do not find relevant publications for 2020.

The topics discussed in this publication about data privacy vary, but still have a common thread with the online system. Online technologies related to data privacy are mobile and web applications, applications that use cloud computing, online system networks, also big data. Part of this publication discusses the online system network (OSN) because OSN such as Facebook, Twitter, Instagram, and LinkedIn, have many loyal users using it.

Other topics aside from discussing online technologies are related to the topics of risk and risk mitigation; data security protection; access control policy; transparency of online service providers, user awareness, and the ethics of those who store and use personal data. One publication can discuss more than one issue, for example the level of user awareness regarding their personal data and their expectations of online service provider transparency. After the 44 publications are sorted into various categories above, we then synthesize them. The topic categories and summaries can be seen in Table 2.

A. Data Privacy Related to Online System Technology

Online system technology continues to grow, with technological advances and faster internet access. Currently various applications can also be accessed with mobile technology and big data technology is increasingly being used.

1) Online system network

Online system network (OSN) is used by millions of users from various countries. Users vary from teenagers to adults, not even children. It is fun to socialize with OSN, but there are risks lurking about the user's personal data (Hossain and Zhang 2015; Kulal and Dhamdhere 2017; Kumar et al. 2017; Luma et al. 2019; Masoumzadeh and Cortese 2017; Polakis et al. 2016; Revathi and Suriakala 2018; Srivastava and Geethakumari 2016; Symeonidis et al. 2016; Tambe and Vora 2017). Personal data of vulnerable

users is sold or used by third parties (Nalinipriya and Asswini 2016; Nandhini and Das 2016; Srivastava and Geethakumari 2016).

Their worries increase when there are cases of data misuse by several OSN (Shinjo et al. 2016; Umair et al. 2017). On the one hand this opens the awareness of users about the importance of reading the OSN privacy policy and regulating who can see their personal data (Albertini et al. 2017; Costa 2016; Hossain and Zhang 2015; Ilia et al. 2017; Klukovich et al. 2016; Minkus et al. 2015; Petkos et al. 2015; Tsirtsis et al. 2016; Van Der Valk et al. 2016). On the other hand they hope OSN is also law-abiding and transparent in the matter of the use of personal data of its users (Hossain and Zhang 2015; Mostafa et al. 2017; Polakis et al. 2016).

2) Mobile and web based application

At this time web-based applications can also generally be accessed by using a mobile device. These applications range from game applications, education, shopping for children's games, health, health insurance, and so on (Hölzl et al. 2016; Thao et al. 2018; Yee 2017a; Zhang et al. 2016, 2015).). Some applications also have features to share with OSN. With the increasing variety of applications embedded in the device, concerns have arisen that the user's data remains stored and then used as material to examine user habits, sell them to third parties, or be tapped to commit criminal acts (Aktypi et al. 2017; Alsalamah 2017; Hung et al. 2016; Leung et al. 2016; Yildirim and Varol 2019).

One of which was discussed is the Fitbit application, users of this application start to worry if the membership of a community increases (Zhang et al. 2015)). They are wary when conversations or historical data on the application are misused (Zhang et al. 2015). There is also research that discusses the importance of protecting one's medical record data when using health insurance applications because it is sensitive data (Zhang et al. 2016). Children's personal data are also prone to be misused when he interacts with smart toys, or online games (Hung et al. 2016).

3) Cloud computing

At present the use of cloud computing more and more with the convenience offered. There are many services that use cloud technology, such as e-voting (Grewal et al. 2015; Sedky and Hamed 2015). Of course this technology has risks because the stored data can be accessed by unauthorized parties (Mijuskovic and Ferati 2016).

4) Big data

At this time many companies are using big data technology for the benefit of companies, both those that are for the public interest, or for economic purposes. The use of personal data is actually something that must be in accordance with the guidelines, relating to the rules of data privacy (Vervier et al. 2017). Lately, there have been many cases of student data being used for educational data mining purposes, where the data is entered in sensitive data (Barril and Tan 2017). Another sensitive big data issue is research using patient data and medical records (Purandhar and Saravana Kumar 2019).

B. Data Privacy Related to Risk

With the increasing dependence of the community on the internet, intentionally or unintentionally their personal data is vulnerable exposed (Aktypi et al. 2017; Burbach et al. 2018; Hossain and Zhang 2015; Kumar et al. 2017; Pirzada et al. 2019; Purandhar and Saravana Kumar 2019; Symeonidis et al. 2016). The risk of exposure to this personal data from cases of buying and selling of their data, fraud, ID and password theft, social engineering attacks, SQL injection attacks, XSS attacks, fake friend profiles, recommendation systems, etc. (Alsalamah 2017; Hölzl et al. 2016; Hung et al. 2016; Leung et al. 2016; Luma et al. 2019; Malloy et al. 2017; Nalinipriya and Asswini 2016; Nandhini and Das 2016; Pirzada et al. 2019; Tsirtsis et al. 2016; Yildirim and Varol 2019). For this reason it is important to do mitigation to minimize the risk of private or sensitive data (Yee 2017a).

C. Data Privacy Related to Data Protection

Protection of personal data that is spread across the online system when it is important that it is not misused (Yee 2017b). This personal data can be in the form of names and inherent attributes including health records, web search records, location, conversation data, and sound cards. Now various data protection technologies are present. One data protection model is to blur the data. The process of blurring this data can be done by encryption(Grewal et al. 2015; Klukovich et al. 2016; Kulal and Dhamdhere 2017; Sedky and Hamed 2015), data masking (Degadwala and Gaur 2017) or by anonymization techniques (Srivastava and Geethakumari 2016; Thao et al. 2018; Zhang et al. 2016). In the process of obscuring data with anonymization techniques, not only anonymized data, nodes and attributes in an OSN graph also need to be anonymized (Srivastava and Geethakumari 2016). In masking techniques can also be done on the data attributes in the form of images (Degadwala and Gaur 2017).

Other data blurring techniques are data sanitization. This system uses the substitution method to clear keywords. Because nouns and verbs provide the most information in a sentence, they will be treated as keywords and the rest of the words will be treated as function words. Keywords will be sanitized using Stanford natural language processing (Tambe and Vora 2017).

Other data protection proposals by using decentralized social networking services use virtual private networks so that data is controlled and does not leave a group (Shinjo et al. 2016). It is also proposed to conduct periodic Fraud Assessment and Detection, for example by regularly checking and verifying fake links and fake friend profiles (Nandhini and Das 2016; Tsirtsis et al. 2016), measuring user exposure through periodic privacy exposure metrics (Masoumzadeh and Cortese 2017), using a data security algorithm for securing personal data pribadi (Pirzada et al. 2019), or using the Logic Rule Generation algorithm to be able to find and analyze the nature of user vulnerabilities (Revathi and Suriakala 2018).

D. Data Privacy Related to Access Control Regulation and Setting Control

Data privacy is related to controls. Users may refuse or grant access to their personal data. For this reason, each OSN must provide control arrangements for who can see the user's personal data and what data can be seen(Albertini et al. 2017; Hossain and Zhang 2015; Klukovich et al. 2016). When this feature is available, users feel safer when sharing information (Van Der Valk et al. 2016). A study proposes a collaborative multi-party access control model that allows all users associated with these resources to participate in access control policy specifications (Ilia et al. 2017).

E. Data Privacy Related to Transparency

Regarding data privacy, some OSN users consider OSN to be not transparent in their data usage policies (Hossain and Zhang 2015). This mistrust is triggered by the many cases of data breaches by selling user data to third parties and various cases that threaten users. For this reason, users expect that there are terms and conditions that mention data privacy and if data is used by the OSN provider (Mostafa et al. 2017).

F. Data Privacy Related to Ethics

The use of personal data under the GDPR is permitted if intended for public purposes and for statistical purposes required by the region or country. However, there are various other provisions relating to research ethics, such as maintaining data confidentiality, respecting privacy, not selling or sharing it with other parties, and so on (Polakis et al. 2016).

G. Data Privacy Related to User Awareness

With many cases of violations in the use of user data, users are increasingly aware of the threatening risks when they give too much personal data to the public. Most users begin to be aware and aware of the attributes of their data that enter sensitive data (Hossain and Zhang 2015; Mijuskovic and Ferati 2016; Umair et al. 2017; Zhang et al. 2015). However, sometimes parents forget that they are neglectful of the privacy of their children's data(Minkus et al. 2015; Tsirtsis et al. 2016). Although for example the visibility has been set for only close people but the child's data remains something risky (Minkus et al. 2015). Some are actually aware of privacy issues, but they then voluntarily share them with certain rewards (Vervier et al. 2017). Because user awareness is important, a study proposes a framework for

measuring privacy awareness in three dimensions, namely visibility, level of control, and privacy score (Petkos et al. 2015).

<div align="center">

Table 2. Summary of Each Category

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Topic	Summary	Key Point	Publications
Online System Technology			
• Online System Network (OSN)	OSN is used by millions of users with various threats to the user's personal data. Moreover, lately there have been many cases of misuse of user data by several OSNs. On the one hand this opens the awareness of users about the importance of reading OSN's privacy policy and regulates who can see their personal data, as well as the expectations of OSN to be transparent in the use of user data.	User awareness, data protection, risk, control setting, transparency	(Albertini et al. 2017; Hossain and Zhang 2015; Ilia et al. 2017; Klukovich et al. 2016; Kulal and Dhamdhere 2017; Kumar et al. 2017; Luma et al. 2019; Masoumzadeh and Cortese 2017; Minkus et al. 2015; Mostafa et al. 2017; Nalinipriya and Asswini 2016; Nandhini and Das 2016; Petkos et al. 2015; Polakis et al. 2016; Revathi and Suriakala 2018; Shinjo et al. 2016; Srivastava and Geethakumari 2016; Symeonidis et al. 2016; Tambe and Vora 2017; Tsirtsis et al. 2016; Umair et al. 2017; Van Der Valk et al. 2016)
• Mobile and Web Based Application	With the increasing variety of applications, including those embedded in the device, there is a concern that the user's data remains stored and then used as material to examine user habits, sell them to third parties, or be tapped to commit criminal acts.	Risk, data misuse, data protection	(Aktypi et al. 2017; Alsalamah 2017; Hölzl et al. 2016; Hung et al. 2016; Leung et al. 2016; Thao et al. 2018; Yee 2017a; Yildirim and Varol 2019; Zhang et al. 2016, 2015)
• Cloud Computing	This cloud technology has risks because stored data can be accessed by unauthorized parties.	Data security and protection	(Grewal et al. 2015; Mijuskovic and Ferati 2016; Sedky and Hamed 2015)
• Big Data	Utilization of personal data must be in accordance with the guidelines, relating to the data privacy rules. Lately there have been many cases of student data being used for educational data mining purposes, where the data is entered in sensitive data.	Ethics	(Barril and Tan 2017; Purandhar and Saravana Kumar 2019; Vervier et al. 2017)
Risk	The risk of exposure to personal data varies, from cases of buying and selling of their data, fraud, ID and password theft, social engineering attacks, SQL injection attacks, XSS attacks, fake friend profiles, recommendation systems, etc.	Risk, mitigation	(Aktypi et al. 2017; Alsalamah 2017; Burbach et al. 2018; Hölzl et al. 2016; Hossain and Zhang 2015; Hung et al. 2016; Kumar et al. 2017; Leung et al. 2016; Luma et al. 2019; Malloy et al. 2017; Nalinipriya and Asswini 2016; Nandhini and Das 2016; Pirzada et al. 2019; Purandhar and Saravana Kumar 2019; Symeonidis et al. 2016; Tsirtsis et al. 2016; Yee 2017a; Yildirim and Varol 2019)
Data Protection	Data protection can be done by obscuring data such as encryption techniques, data masking, data	Data blurring, fraud	(Degadwala and Gaur 2017; Grewal et al. 2015; Klukovich et al. 2016; Kulal and Dhamdhere

Topic	Summary	Key Point	Publications
	sanitization, or anonymization techniques. Other methods are using fraud assessment and detection, also by privacy exposure metrics.	detection, security	2017; Masoumzadeh and Cortese 2017; Nandhini and Das 2016; Pirzada et al. 2019; Revathi and Suriakala 2018; Sedky and Hamed 2015; Shinjo et al. 2016; Srivastava and Geethakumari 2016; Tambe and Vora 2017; Thao et al. 2018; Tsirtsis et al. 2016; Yee 2017b; Zhang et al. 2016)
Access Control Regulation and Control Setting	Data privacy is related to controls, users may refuse or grant access to their personal data. For this reason, each OSN must provide control settings for who can see the user's personal data and what data can be seen.	Access control, control settings	(Albertini et al. 2017; Hossain and Zhang 2015; Ilia et al. 2017; Klukovich et al. 2016; Van Der Valk et al. 2016)
Transparency	Users expect that there are terms and conditions that state if data is used by the OSN provider.	Transparency	(Hossain and Zhang 2015; Mostafa et al. 2017)
Ethics	The use of personal data is permitted if it is intended for public purposes and for statistical purposes required by the region or country. Related to research ethics, such as maintaining data confidentiality, respecting privacy, not selling or sharing it with other parties, and so on.	Ethics	(Polakis et al. 2016)
User Awareness	With many cases of violations in the use of user data, users are increasingly aware of the threatening risks when they give too much personal data to the public. There are also those who are aware of privacy issues, but they then voluntarily share them with certain rewards.	User awareness	(Hossain and Zhang 2015; Mijuskovic and Ferati 2016; Minkus et al. 2015; Petkos et al. 2015; Tsirtsis et al. 2016; Umair et al. 2017; Vervier et al. 2017; Zhang et al. 2015)

Based on the information in Table 2, there are several key points that are often reviewed in each topic. Key points that are widely reviewed are about risk and mitigation, security and data protection, user awareness, control settings and access control, transparency, fraud detection, and ethics. Because there are several terms that are similar and can be combined, we propose six key points that still need to be considered in maintaining data privacy when using online applications. The key points are security and data protection, user awareness, control settings, risk management, transparency, and ethics as in Figure 3. Fraud assessment and detection can be a part of risk management and security and data protection. While, access control of data is included in the control setting.
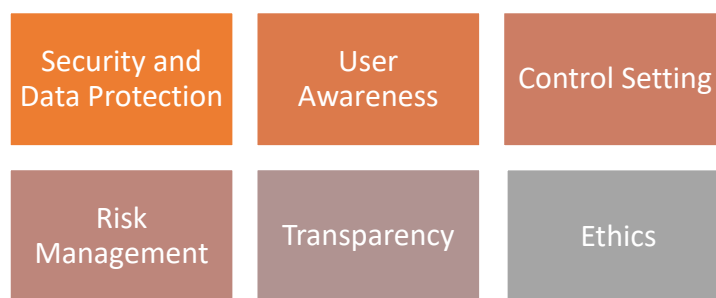
Figure 3. Key Points in Data Privacy

Conclusion and Future Work

Until now there are still many cases of misuse of personal data in the online system. Several cases were revealed that increased user awareness of the importance of protecting personal data. The also demanded service providers to respect privacy data.

Based on research using a systematic review, we found 44 publications (2014-2019) that discussed data privacy. After we categorized and synthesized them, we found six key points that must be considered when using an online application system related to data privacy. These six points are security and data protection, user awareness, control settings, risk management, transparency, and ethics.

This research is still a preliminary study, so there are still many things that can be explored based on this research. Next, we will conduct a gap analysis between key points in data privacy and personal data protection regulations in Indonesia.

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