Ontology Modelling on Legal Document  
Case Study: Legal Document of Indonesian Republic

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Abstract. Regulation representation and reasoning process of the regulation representation is an important thing for finding inconsistency in Indonesian Republic Regulation Document. Indonesia is a legal nation. The mean of Legal Nation is that nation using law to regulate the life of society, state, and the government. Indonesia has been using law to maintain it’s stability since it’s founded. An inconsistence in law has been found in Indonesian regulation document. In this paper, we proposed a method to represent a Indonesian Republic regulation in an ontology form for reasoning process. Ontology language that used in this paper is OWL. The purpose of this representation is to be able to do a reasoning process to find inconsistent regulations and do the process of finding concepts in regulations. After transforming Indonesian Republic regulation document into OWL ontology form and reasoning process of Indonesian Regulation ontology inconsistency has been found.

1. Introduction
Republic of Indonesia is a nation that use law to regulate the society, nation, and government. written regulations contain generally binding legal norms and are established or stipulated by state institutions or authorized officials through the procedures stipulated in the legislation [1]. The Law of the Republic of Indonesia contains rules that must be obeyed by the people in politics and law to regulate common life in the state or can be said as a principle governing the power of the government, the rights of the people, and the relationship between the two. According to Law Number 12 of 2011 article 9 paragraph 1 which reads "In the case of a Law allegedly contradicting the 1945 Constitution of the Republic of Indonesia, the test is conducted by the Constitutional Court", and paragraph 2 which reads "In the case of a Legislation under the Act allegedly contradicts the Law, the test is carried out by the Supreme Court”.

Until now, the Supreme Master and the Constitutional Court have conducted a review (judicial review) of state administration on the many laws and regulations of the Republic of Indonesia and have found many inconsistencies in the laws and regulations of the Republic of Indonesia and revoked these laws. The results of the assessment can be found on the website of the Supreme Court and the Constitutional Court.

To assist the reasoning process of the laws and regulations of the Republic of Indonesia, this research proposes an ontology representation as a formal representation of the laws and regulations of the Republic of Indonesia.
2. Ontology
Ontology is a representational artifact, comprising a taxonomy as proper part whose representations are intended to designate some combination of universal, defined classes, and certain relations between them. An ontology defines a set of representational primitives with which to model a domain if knowledge discourse. The representational primitives are typically classes (or sets), attributes (or properties), and relationship (or relations among class members). The definition of the representational primitives includes information about their meaning and constraints on their logically consistent application [2].

Ontology is an explicit specification of a conceptualization. An object, concepts, and other entities that are presumed to exist in some area of interest and the relationship that hold among them [3]. The essential points of this definition is:
1. An ontology defines (specifies) the concepts, relation-ships, and other distinctions that are relevant for modeling a domain [3].
2. The specification takes the form of the definitions of representational vocabulary (classes, relations, and so forth), which provide earning for the vocabulary and formal constraints on its coherent use [3].

Ontology reasoning is deriving facts that are not expressed in ontology or knowledge base explicitly [4]. These are several task required in resoner [4]:
1. Satisfiability of a concept. This task is determined whether a description of a concept is not contradictory.
2. Subsumption of concepts. This task determines whether concept C subsumes concept D.
3. Consistency of ABox with respect to TBox. This task determines whether individual in ABox do not violate descriptions and axioms described by TBox.
4. Check of Individual. This task determines whether the individual is an instance of a concept.
5. Retrieval of Individuals. This task finds all individuals that are instance of a concept.
6. Realization of an individual. This task find all concepts which the individuals belong to.

3. Related Work
LegalXML is a markup language for legal document. LegalXML use to represent the structure for law document [7]. LegalXML describe create a tag to label the structura part of legal document such as preamble, conclusion, section, etc. Semantic Business Vocabulary and Business Rules is a formal representation of business rules [8]. SBVR represent rules in a natural language so for reasoning process need a transformation from SBVR form into other representation like database,etc.

Legal Knowledge Interchange Format (LKIF) is a legal ontology that describe term that exist in legal domain created by Estrella [6]. LKIF describe expression, norm, process, action, role, place, time and mereology. But there is some different concept in Indonesian Republic Regulation and there is a lot of detailed concept which is not used for the purpose of this research.

4. Regulation Representation Analysis
Indonesia Republic Regulation is written in a well-structured Bahasa Indonesia. For reasoning process regulation of Republic Indonesia need a transformation to a formal form. In this research we use ontology representation as a formal representation of Indonesian Republic regulation. We proposed a way to transform Indonesian Republic regulation into OWL ontology.

a. Determine the ontology components such class, Object Property, and Data Type that apply to all Indonesian Republic regulation.
b. Determine the ontology component such class, Object Property, and Data Type that only apply in particular regulation document.
c. Transform Indonesian Republic regulation document using the core concept and the specific concept that has been obtained.
Below is the description of figure 1:
1. Extracting Indonesian republic regulation and representing it into OWL. Extraction process is aided by POSTagger and PhraseChunker.
2. Indonesian Republic regulation document are two document that have different hierarchy. The meaning of different hierarchy is that one document has higher law power than the other.
3. ID_OWL_LAW is core ontology that consist general concept of Indonesian republic regulation.
4. Indonesian republic regulation in OWL form.

Reasoning process in figure describe as below:
1. The input for reasoning process is Indonesian republic regulation in OWL form.
2. Do reasoning process
3. Result of inconsistence regulation and query.

To express Indonesian Republic regulation into OWL form. Norm sentence will be categorized into concept and relation. After concept and relation created, instantiation process were done for reasoning process. These are steps to create Indonesian Republic regulation ini OWL:
1. Determine classes
2. Determine ObjectProperty
3. Determine DataProperty
4. Determine Individual

4.1. Determine Classes
Based on Law Number 12 Year 2011 these are some general concept that exist in Indonesian Republic Regulation which will be made into classes:
1. Legal_Document
   Legal_Document is all various type of Indonesian Republic regulation document such:
a. The 1945 constitution
b. Decree of the People’s Consultative Assembly
c. Law Act
d. Government Regulation Act’s substitute
e. Government Regulation Act
f. Presidential Decree
g. Provincial Regulation
h. City Regional Regulation
i. District Regulation
j. Ministerial Regulation
k. People’s Consultative Assembly Regulation
l. House of Representatives Regulation
m. Supreme Court Regulation
n. Constitutional Court Regulation
o. Audit Board Regulation
p. Judicial Commission Regulation
q. Bank Indonesia Regulation
r. Agency Regulations
s. Institution Regulation
t. Commission Regulations

![Figure 3 Class Legal_Document and Subclasses of Legal_Document](image)

2. Legal_Consequence

Legal_Consequence is a class that describe the consequences of norm violation. These are some consequences of norm violation:

a. License revocation (Pencabutan Izin)
b. Fine (Denda)
c. Probation (Masa Percobaan)
d. Jail (Penjara)

![Figure 4 Class Legal_Consequence and Subclasses of Legal_Consequence](image)

3. Legal_Norm

Legal_Norm class consist type of norm that exist in Indonesian Republic Regulation such:

a. Definition / Definisi
b. Abbreviation / Singkatan
c. Right / Hak
d. Obligation / Kewajiban
e. Prohibition / Larangan
f. Authority / Kewenangan
g. Order / Perintah
Figure 5 Class Legal_Norm and Subclasses of Legal_Norm

4. Agent
Class agent is used to describe the agent that consist in norm.

Figure 6 Class Agent and Subclasses of Agent

5. Role
Class role is used to describe the role held by the agent.

Figure 7 Class Role and Subclasses of Role

To determine classes that only exist in particular Indonesian Republic Regulation, the classes are determined from the noun or noun phrase that has word class subject or object in Well Structured Indonesian Language norm sentence.
Example:
(Subject) Penuntut Umum (Predicate) menyerahkan (Object) berkas perkara.
From example above the concept for classes are “Penuntut Umum” and “Berkas Perkara”

4.2. Determine ObjectProperty
There are some relation in a general concept of in Indonesia Republic Regulation document such:
  a. Entitled
  b. Authorized
  c. Could
  d. Mandatory
  e. Must
  f. Given
  g. banned
  h. cover
  i. consist in

To determine the relation that only exist in particular Indonesian Republic Regulation the relation or ObjectProperty are taken from word class predicate in Well Structure Indonesia Language norm sentence.
Example:
(Subject) Penuntut Umum (Predicate) memberikan (Object) Berkas Perkara
From example above the ObjectProperty is “memberikan”

4.3. Determine DataProperty
DataProperty that generally exist in Indonesian Republic Regulation are:
  a. Name (Nama)
  b. Number (Nomor)
  c. Year (Tahun)
  d. The longest (palingLama)
  e. The fastest (palingCepat)
  f. At least (palingSedikit)
  g. At most (palingBanyak)
To determine DataProperty that only exist in particular Indonesian Republic Regulation, the DataProperty are determined from word class nominal explanation (keterangan nominal) in well-structured Indonesian Language norm sentence.

4.4. Determine Individual
Individual is an instantiation from classes which will be connected to other individual’s class using relation. Individual taken from Indonesian Republic Regulation norm sentence.

5. Representing Norm in OWL

5.1. Describe Definition Norm
To describe Indonesian Republic Regulation definition norm (Norma Definisi) we used class expression Object EquivalentTo.
Example:
Legal aid recipients are poor people or groups of poor people.
From sentence above we create class:
   a. Penerima_Bantuan_Hukum (Legal aid recipients).
   b. Orang_Miskin (Poor people), and
   c. Kelompok_Orang_Miskin (Groups of poor people).

Then we create class expression axiom:
Penerima_Bantuan_Hukum ≡ Orang_Miskin ∪ Kelompok_Orang_Miskin.

5.2. Describe Abbreviation Norm
To describe definition norm, we use class Singkatan and relation disebut.
Example:
The Indonesian Army is hereafter referred to as the TNI
We create class Tentara Negara Indonesia and Individual tentara_negara_indonesia and TNI which TNI is type class Singkatan then we create an ObjectProperty assertion:
Disebut (tentara_negara_indonesia, TNI)

5.3. Describe Authority Norm
To describe authority norm, we use class expression axiom EquivalentTo and ObjectProperty Assertion. Individual will be categorized according to norm type such as authority, obligation, right etc.
Example:
The Minister has the authority to establish law enforcement programs and take legal action.
From sentence above we can extract class and ObjectProperty below:
   1. Classes
      a. Menteri (minister)
      b. Program Penegakan Hukum (law enforcement program)
      c. Tindakan Hukum (legal action)
   2. ObjectProperty
      a. Menetapkan (establish)
      b. Mengambil (take)
   3. Individual
      a. Menteri
         Individual menteri will have type agent.
      b. Program_penegakan_hukum
         Individual Program_penegakan_hukum will have type Kewenangan and Program_Penegakan_Hukum.
      c. Tindakan_hukum
         Individual Tindakan_hukum will have type Kewenangan and Program_Penegakan_Hukum.
6. Implementation

In this research we use the case of Law Number 18 Year 2003 about Advocate and Minister of Law and Human Rights Number 01 Year 2018 about Paralegal. In the Law number 18 year 2003 it is said that legal assistance is a legal services that is given by advocate to unable client. But, in the minister of law and human rights Regulation said that paralegal can give a legal assistance in and out court.

Here are the norm in the Law number 18 year 2003:

1. Legal Services are services provided by Advocates in the form of providing legal consultations, legal assistance, exercising power, representing, assisting, defending, and carrying out other legal actions for the client's legal interests.

From the legal services norm sentence we get class as below:

a. Jasa Hukum (Legal services)
b. Konsultasi Hukum (Legal consultation)
c. Bantuan Hukum (Legal assistance)
d. Tindakan Hukum (Exercising Power)
e. Advokat (Advocate)
f. Paralegal

In paralegal class we add a “disjointWith” relation to emphasize that a paralegal is a disjoint role with advocate.

From the legal services norm sentence we get relation as below:

a. Diberikan. (given)
b. Memberikan (giving). This relation made as an inverse of relation “diberikan”.
c. Menjalankan (exercise)
d. Mewakili (represent)
e. Diwakili (represented by). This relation is made as an inverse of “mewakili” relation.
f. Membelaa (defending)
g. Dibela (defended by). This relation is made as an inverse of “membela” relation.
h. Mendampingi (assisting)
i. Didampingi (assisted by). This relation is made as an inverse of “mendampingi” relation.

After the class and relation has been made the next step is creating a class expression axiom in Jasa Hukum class. The axiom that has been created is represented as below:

Jasa Hukum ≡ (diberikan some Advokat) and (memberikan some Bantuan Hukum) or (memberikan some Konsultasi Hukum) or (memberikan some Tindakan Hukum) or (mewakili some Klien) or (mendampingi some Klien) or (menjalankan some Kuasa)

2. Clients are people, legal entities, or other institutions that receive legal services.

From the client norm we get a class as below:

a. Orang (Person)
b. Badan Hukum (Legal entities)
c. Lembaga (Institution)
From the client norm we get relation “menerima” (receive). Below is the class expression axiom of client norm.

\[ \text{Klien} \equiv \text{Orang or Badan_Hukum or Lembaga} \land \text{menerima some Jasa_Hukum} \]

3. Legal Aid is a legal service provided by Advocates free of charge to clients who cannot afford it.
   From the norm sentence above we create class:
   a. Incapability client
      \[ \text{Klien Tidak Mampu} \equiv \text{Klien} \]
   b. Free

   From the norm sentence before we create relation:
   a. diberikanOleh / givenBy.
   b. memberikan / giving. This relation made as an inverse of “diberikan” relation.
   c. diberikanSecara / given.
   d. diberikanKepada / givenTo. The word “oleh”, “secara”, and “kepada” in the norm sentence above are used to clarify the meaning so that it is not ambiguous.

4. Provision of Legal Aid in litigation by Paralegal is carried out in the form of advocate assistance in the same scope of the Legal Aid Provider. Assistance as referred to includes:
   a. accompaniment and / or carrying out a power of attorney starting from the level of investigation, and prosecution;
   b. accompaniment and / or exercising power in the examination process at the trial; or
   c. accompaniment and / or exercising power over the Legal Aid Recipients in the State Administrative Court.

   Provision of Legal Aid nonlitigated by Paralegals as referred to in Article 10 is carried out through activities:
   a. legal counseling;
   b. legal consultation;
   c. case investigations, both electronically and non-electronically;
   d. legal research;
   e. mediation;
   f. negotiation;
   g. community empowerment;
   h. outside court assistance; and / or
   i. drafting legal documents.

   From the norm above we create class as below:
   a. Bantuan_Hukum_Litigasi (litigation legal aid)
   b. Bantuan_Hukum_Non_Litigasi (Non litigation legal aid)

   From the norm litigation legal aid and non-litigation legal aid we create relation as below:
   a. Menjalankan (exercise)
   b. dijalankanOleh (exercised by). “dijalankanOleh” is an inverse relation of “menjalankan”.

   Here are the individual that we instantiate in litigation legal aid class:
   a. kuasa_tingkat_penyidikan (power of attorney at the investigation level)
   b. kuasa_tingkat_penuntutan (power of attorney at the prosecution level)
   c. kuasa_pada_proses_pemeriksaan_di_persidangan (power of attorney at the hearing process at the trial)
   d. kuasa_di_pengadilan_tata_usaha_negara (power of attorney in the state administrative court)

   Here are the individual that we instantiate in non-litigation legal aid class:
   a. legal counseling
c. case investigations electronically
   b. legal consultation
d. case investigation non-electronically
e. legal research  
f. mediation  
g. negotiation  
h. community empowerment  

7. Reasoning Process
In this paper the aim of reasoning process is to find inconsistence regulation and retrieval process using query. The task of reasoning are:
1. Consistency of ABox with respect to TBox
   This reasoning task is used to know that does the individual describe did not violate concept description. The meaning of violation is does there is a norm in Indonesia Republic Regulation that contradict with another regulation.
2. Check an Individual
   This will check does the individual is an instance of some concept.
3. Realization of Individuals
   This task reasoning will find all concept which individual belongs to.
4. Retrieval of Individuals
   This task reasoning will search all individual in particular concept.

Before reasoning process is carried out assertion process need to be done here are the individual assertion:

| No | Class | Individual       |
|----|-------|-----------------|
| 1  | Advokat | advokat-uu |
| 2  | Paralegal | paralegal-pm |
| 3  | Bantuan_Hukum_Litigasi | kuasa_tingkat_penuntutan |
| 4  | Bantuan_Hukum_Litigasi | kuasa_tingkat_penyidikan |
| 5  | Bantuan_Hukum_Non_Litigasi | Penyuluhan_hukum |
| 6  | Bantuan_Hukum_Non_Litigasi | konsultasi_hukum |
| 7  | Bantuan_Hukum_Non_Litigasi | investigasi_perkara_elektronik |
| 8  | Free | cumacuma |
| 9  | Kelompok_Orang_Miskin | kelompok_orang_miskin |

| No | Individual | ObjectProperty | Individual |
|----|------------|----------------|------------|
| 1  | advokat-uu | menjalankan | kuasa_tingkat_penuntutan |
| 2  | kuasa_tingkat_penuntutan | diberikanSecara | cuma-cuma |
| 3  | kuasa_tingkat_penuntutan | diberikanKepada | kelompok_orang_miskin |
| 4  | Paralegal-pm | menjalankan | kuasa_tingkat_penuntutan |

Below is the result of inconsistence checking using HermiT and FacT++ reasoned with case study: Law Number 18 Year 2011 About Advokat with Minister of Law and Human Rights Number 01 Year 2011.

Figure 8 Result using HermiT and Fact++
Explanation of inconsistency:
1. Paralegal-pm Type Paralegal. Individual paralegal-pm is an instance of Paralegal.
2. Kuasa_tingkat_penuntutan Type Bantuan_Hukum_Litigasi. Individual Kuasa_tingkat_penuntutan is an instance of Bantuan_Hukum_Litigasi.
3. Paralegal-pm menjalankan kuasa_tingkat_penuntutan.
4. Advokat DisjointWith Paralegal. Advokat and Paralegal is a different role which is if someone is an Advokat than that person cannot be a Paralegal.
5. Bantuan_Hukum_Litigasi EquivalentTo (diberikanKepada only Klien_Tidak_Mampu) and (diberikanSecara only Free) and (dijalankanOleh only Advokat)
6. Dijalankan InverseOf menjalankan. Dijalankan is an inverse relation of menjalankan.

From explanation above it is said that point number 3 is inconsistence with the definition of bantuan_hukum_litigasi in number 5 where bantuan_hukum_litigasi can only be given by Advokat.

Below is the question that can be asked to legal ontology with case study above:

Table 3 Questions

| No | Question                                           |
|----|---------------------------------------------------|
| 1  | Describe Advocate authority?                      |
| 2  | Who is eligible to get some legal assistance?     |
| 3  | Describe legal assistance?                        |

8. Conclusion
Using OWL ontology representation, we can find inconsistence norm in Indonesian Republic Regulation by defining norm concept into class expression and creating individual. By representing Indonesian Republic Regulation in ontology form we can retrieve some information according to the concept described in the regulation.

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