Prototyping a Taxonomy of Value Types

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Abstract. Service industry is a dominant industrial discipline among developed countries. The structure of service activities is recognized to be complex because interactions among a producer, a customer and an environment are intrinsically occurred in the service system. Value is an important concept for understanding of services itself, decision making for business strategy etc. However, the concept tends to be used as economic value even though there are many types of value. This paper provides prototype taxonomy of value types to describe what kinds of value types exist. We extract value concepts from a literature and then organize the concepts into a prototype taxonomy.

Keywords. Value, Service, Taxonomy of value types

1. Introduction

1.1. Background

Service industry is a dominant industrial discipline among developed countries including Japan. The structure of service activities is recognized to be complex because co-creation is intrinsic part of the service system. There are some research efforts to describe it clear. Vargo and Lusch proposed "value co-creation" to clarify the importance of the interaction among customers and employees for value creation [21]. Ueda et al, provided three value creation model from a production engineering viewpoint [19, 20].

Those two research efforts tackled to make the concept “value co-creation” clear, however the notion of “value”, which is an important component of value co-creation, is still used as various meanings [1, 2, 15]. The notion of XaaS (X as a service such as Mobility as a Service) and sharing economy are broadening the boundary between value creator and value receiver even further. It causes difficult to clarify value further.

From a practical viewpoint, quality of service activities should be measured to improve quality of service effects. The clarification of “value” is important in this context because the value can be interpreted from various viewpoints. Nishimura and Fukuda provided a prospect to make the indicator of value by clarifying value types [13]. We focus on clarifying value types from an engineering viewpoint and our goal is not clarifying detailed value types in any domain, such as religious value, ethical value, etc. but clarifying value types which related to economic activities. The detailed motivation is described in section 1.2.

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1.2. Motivation

Companies tend to evaluate the prospect of new business from economical viewpoints. This strategy is simple and good to choose beneficial business activities for the company. However, the strategy might be harmful from a sustainability viewpoint. For instance, some jobs may help the company to increase employees' satisfaction, some jobs may help their customers to gain understanding and loyalty toward the company, some jobs may help the company to get customers information. And it can happen that all these jobs do not contribute to make money directly. An example is servitization of manufacturing, which tends to fail without proper non-economical KPIs (Key Performance Indicators) during the investment phase when profit is very low.

We provide a case scenario as follows. Company A decides to provide more hospitable maintenance service. The company should collect customer data for efficient after-support services to the customer. The data collection may be operated by salespeople who usually promote to sell products of the company A. Therefore, the data collection job does not contribute to increase profit of the company A. In this case, a business manager should be aware of not only profit (as economical value) but also customers' data (as non-economical value). The former one become beneficent soon and the latter one contributes to the company in the future. It is difficult decision-making for the manager without the indicator of value.

There is no standard notion of value yet [1]. This should prevent the managers of the company decide what value they should increase. Therefore, we will classify types of value in appropriate manner based on ontological engineering method. Then, we will investigate what measurement indicator is measurable and suitable for each type of value. For the first step, we prototype a taxonomy of value types.

1.3. Structure of paper

In this paper, we provide data collection about concepts related to value from literature and prototyped taxonomy of value types. In section 2, we show how we collect concepts related to value. In section 3, we describe the prototype of taxonomy of value types and some definitions of value. In section 4, we describe related work about the notion of value. In section 5, we summarize our paper.

2. Collection of concepts related to value

Ueda et al. [20] surveyed papers in axiology from a viewpoint of production engineering. Their focal point is value creation and decision-making in sustainable society, and they proposed models to describe value creation in a complex service system as the consequence of the survey. We collected concepts related to value from the paper. Hereafter, we write names of value types in Italics.

First, we extracted the terms including a word "value" by using a text mining tool, which is called as KH Coder [6]. 87 terms were collected by the automatic extraction step and we selected 26 terms which represent specific values, such as *Sustainable value* and *Economic value*. Second, we also extracted concepts related to value not containing a word "value" by manual surveying. Some value types, which do not have their names explicitly, were conceptualized in this step and 12 concepts were extracted, such as *Value of human knowledge* and *Value as intersubjective phenomena*.

After the extraction steps, we selected meaningful concepts from the extracted terms. The definitions of 15 terms are lack in the literature therefore we decide to exclude these terms in this research. According to the previous works [15, 18] and reviewers' comments to the first version of this paper, we made distinction of these concepts into value, value object which the value inheres in, and amount of value. For example, *Value as the volume of net products* and *Surplus value* are interpreted as the amount of value. These values can be described as the summation of value and additive value respectively. However, if the value is regarded as quality, such calculation is difficult. Therefore, we interpreted these values as not value type but the amount of value. *Sustainability* and *Fundamental value (nature)* are interpreted as value object on the other hand. For example, Ueda et al. explained the latter value as "nature is regarded as the object of study and investigation by science and not as the field of manifestation of divine forces." The sentence denotes that nature has utility for the scientists to investigate, therefore it can be interpreted as not value type but value object.

The results of the selection show on table 1 and 2. We got 8 meaningful concepts at the result. Table 1 shows the concepts which we included in a taxonomy and table 2 shows the concepts which we excluded in this paper.

Table 1. Considered concepts including in a prototype taxonomy

Use value	Value of human knowledge
Exchange value	Economic value
Surplus value	Marginal utility
Ordinal utility	Cardinal utility

Table 2. Excluded concepts in a prototype taxonomy

Knowledge value	Pragmatic value
Cognitive value	Psychological value
Subjective notion of good	Meta-knowledge value
Human natural value	Sustainable value
Value from cognitive development	Bland value
Behavioural Value	Synthetic value
Functional value	Utility value
Ecological value	Non-objective value
Provided value	Adaptive value
Co-creative value	Value in value engineering
Value as the volume of net products	Value as intersubjective phenomena
Maximization of pleasure	Minimization of pain
Protection, safety and peace	Objective Value
Subjective value	Absolute value
Natural value	Sustainability
Fundamental value (nature)	

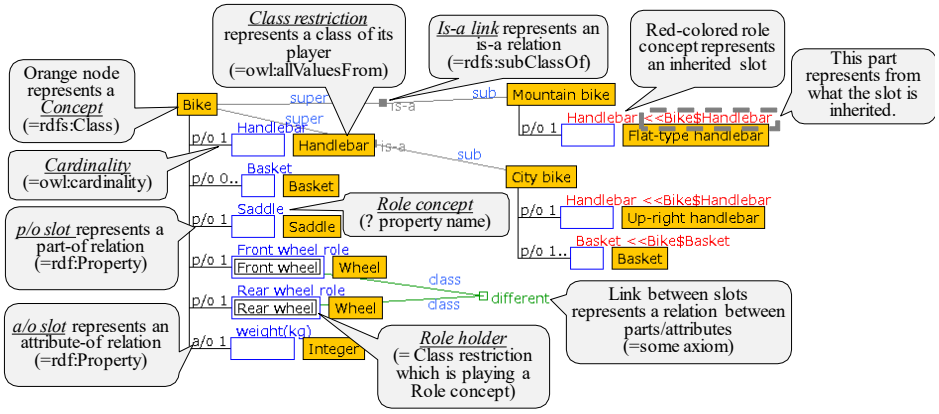

Figure 1. Overview of ontology representation in Hozo [9]

3. Prototyping a taxonomy of value types

3.1. Hozo ontology editor

We use Hozo [9] to prototype the taxonomy of value types. Hozo is an ontology editor which is widely used in various domains, such as clinical domain [12], sustainability domain [10], education domain [5] and manufacturing domain [8]. Figure 1 shows an overview of representation of class definition in Hozo. Orange nodes represent concepts which can be interpreted as whole thing, such as Bike. Each concept has properties and they are represented as slots in Hozo. There are two types of slots (p/o and a/o). A p/o slot represents a part-of relation and an a/o slot represents an attribute-of relation. The property is represented as Role concept which has Class restriction as its player. The Role concept with its player is interpreted as Role holder. In this example, Wheel is a concept and it is called as Front wheel when it plays Front wheel role, on the other hand, it is called as Rear wheel when it plays Rear wheel role. The properties are inherited to the specified concepts which is linked by is-a link as same as other ontology representation tools.

3.2. Overview of a taxonomy of value types

Figure 2 shows a prototype taxonomy of value types. We added some concepts to clarify classification criteria in the taxonomy. First, *Value of knowledge* is added as an abstract concept of *Value of human knowledge. Value of explicit knowledge* is added for opposite concept of *Value of human knowledge*. The detail description of these concepts is shown in section 3.3 with their classification criteria.

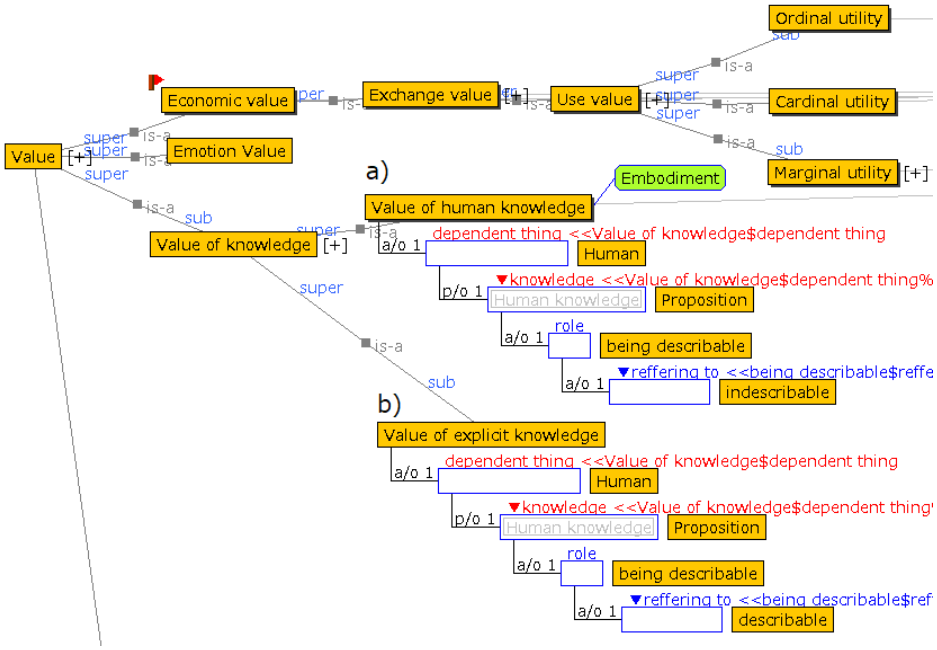

Figure 2. Prototype taxonomy of value types

3.3. Classification of intrinsic value types

3.3.1. Economic value, Emotion value, and Value of knowledge

According to Toya's notion of value [18], we classified values into three types. The first one is *Economic value*. We defined that *Economic value* is measurable by using money. If the value object to which *Economic value* is inhered is able to exchange with money, then the value is defined as *Exchange value*. *Use value* is defined as usefulness of a product/service or its utility. It is also able to be exchanged so that we classified *Use value* as a subclass of *Exchange value*. The second branch of value is *Emotion value*. *Emotion value* is defined that a value is related to emotion. The third branch of value is *Value of knowledge*. *Value of knowledge* is defined that a value inheres in knowledge. The details of subclasses of the *Value of knowledge* is described in section 3.3.2.

3.3.2. Value of knowledge

There is *Value of human knowledge* which is defined as "(Omitted) the word "Embodiment" represents a similar aspect of values of human knowledge." In this context, the term *Value of human knowledge* means only knowledge which is inherent to human body, such as skill. However, there is other type of knowledge, i.e. explicit knowledge which is written in a concrete media and interpretable by other people. Therefore, we added *Value of explicit knowledge* as an opposite concept of *Value of human knowledge* and *Value of knowledge* as an abstract concept of them. As shown in figure 2 a), *Value of human knowledge* depends on human and the human has some proposition as knowledge and the knowledge is indescribable. On the other hand,

knowledge which *Value of explicit knowledge* refers is describable. That is a classification criterion among them.

4. Related work

4.1. Service management viewpoint

Toya provides three types of value from a service management viewpoint [18]. Economical value is chosen as a measurement indicator to decide business plan in many cases as we mentioned in section 1. She also consists that there are considerable other types of value when the management sector develops long-term business plan, such as expertise knowledge of employees and customers' loyalty and emotion toward products, employees or brands, etc. Toya defines Knowledge Value (KV) as the accumulated knowledge held by co-creators and Emotion Value (EV) as the affective value associated with customer and employee moods and perceptions in [18]. However, there are not enough discussion what is the differences among the value types and the other value types which are discussed in literatures.

4.2. Value modeling viewpoint

There are also research efforts from value modeling viewpoint. Hruby [7] and da Silva Reis [3] discuss components related to value. Proper et al. try to construct a modeling framework focusing on value co-creation [14]. Andersson et al. propose a model of value ascription [2].

Hruby provided a model focusing on coalition [7]. Coalitions can be dealt as a kind of context in which people who want to exchange something valuable in the value exchange processes. Such a model helps us clarify the notion of value exchange and it can be a component of describing value types.

da Silva Reis et al. proposes a notion to configure value networks based on subjective business value [3]. The interest is also realizing sustainable economy as same as Ueda et al. [20]. They also put subjectivity as key concept to configure a value network. However, the scope of the subjectivity is only assurance, privacy and trust and it is not comprehensive.

Proper et al. are constructing a modeling framework about value co-creation [14]. The framework is based on a notion of [4]: potential value in production context and real value in the context of interactive value creation and independent value creation. The distinction of value in this context seems to be based on phases of value creation not characters of the value types.

Andersson et al. focuses on value ascription [2]. They also mentioned subjectivity of value as same as other research [3, 7, 14]. Additionally, in the paper, the context is key notion. Ascribed value to different value objects can be comparable in the same context. For the comparison, they introduce "value structure." However, the component of value structure is not discussed well, and they do not clarify whether the value includes only fundamental value or other types of value.

5. Summary

As the first step to understand value, we prototype a taxonomy of value types. We extracted terms related to value from a literature [20] and got 87 terms. Then, we selected 8 meaningful concepts from the extracted terms. After that, we clarify the classification criteria among the concepts and prototype the taxonomy of value types.

As a future work, we will integrate other contribution provided in related work. We will also try to make other scenarios rather than we mentioned in the section 1 according to the proposed taxonomy because the scenarios we mentioned in the section 1 refer to limited types of value. Such concretization of the scenarios can contribute to improve decision making for services industry.

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