Special Issue of the Infocommunication Journal

A Novel Idea Generation Method for the Internet of Digital Reality Era: The Spinning Aufheben Method

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***Abstract*—Internet of Digital Reality (IoD) will be one of the essential next-generation information technologies. The content and presentation of information are the most important aspects that will make IoD work efficiently. However, the generation of ideas for IoD has not much progress in discussion because formalizing it is difficult. This paper presents an outline of the Spinning Aufheben (SA) method, which is a novel idea generation method, its application and model, validity, actual cases of the first application of the author, and potential social impact. *Aufheben* is one of the common mechanisms for generating ideas from two elements. This method enables the infinite generation of ideas by rotating three elements of a dialectic. We also present the result of pilot projects on 51 university students to determine its effectivity as an application for helping them determine future career plans after graduation. As a result, 46 students identified their career goals. The students expressed appreciation of the career search results using the SA method.**

***Index Terms*—CogInfoCom; Idea generation; Internet of Digital Reality; Kneading idea; Spinning Aufheben**

I. Introduction

Generating ideas is vital for economic activities. Therefore, scholars propose various methods for idea generation [1-3]. People need to generate ideas for various purposes such as business, creative work, and career design. Great innovation is rooted in great creativity. Reference [4] cites that "creativity is the invention or origination of any new valuable thing. It is a process of producing something that is both original and worthwhile and is one of the hardest human intelligence abilities." Therefore, creativity essentially underlies the generation of ideas.

In the ear of Internet of Digital Reality (IoD), generating ideas is important. IoD presents numerous possibilities. However, creating new services in IoD is becoming difficult, which can be analogized to finding a grain of sand in the ocean.

This paper was submitted to Infocommunications Journal for review on March 31st 2022.

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When generating ideas, two aspects should be considered.

(1) The number of ideas that can be generated within a limited time; and

(2) Consolidation of ideas.

The first author is currently a film director and writer, but he is involved in many fields such as management consulting, education, entrepreneurship, and advertising. These fields are seemingly very diversified, but, essentially, the core of his activities in each field remains the same, that is, idea generation. Especially, generating many ideas and selecting and improving them are important to his activities. For this reason, a method that supports this idea generation process is required. Through various experiences, we proposed a unique idea generation method called Spinning Aufheben (SA) [5], with which aufheben can be made multiple times for the same issue. This method was invented to solve two problems in idea generation based on *aufheben* and an infinite loop of dialectic. Aufheben is one of the common mechanisms for generating an idea from two elements.

This study provides details of the SA method, a mathematical model, and two actual cases. The remainder of the paper is structured as follows. Section 2 presents the outline of the SA method, whereas Section 3 cites related works. Section 4 describes the modeling and implementation. Section 5 explains the cases, and Section 6 discusses the details of a pilot project. Section 7 concludes.

II. The Spinning Aufheben Method

Combining two elements to generate ideas is a commonly used approach. When combining two elements, people intend to make an *aufheben* happen. The Oxford Dictionary of Philosophy defines aufheben as follows: "In the philosophy of Hegel, dialectical progress occurs when each of a thesis and its antithesis are aufgehoben, or overcome by a synthesis that builds only on the good bits of each." Thus, aufheben differs from the mere combination of two elements. In fact, it involves a third element, that is "value(s)," because it needs a certain direction to *progress*, as defined in the dictionary.

The SA method is used to generate ideas by consciously utilizing the value(s) as the third element. It is conducted in the following steps:

(1) Defining three elements for *thesis*, *antithesis*, and *synthesis*;

DOI: 10.36244/ICJ.2023.6.3

(2) Finding key words for thesis and antithesis;
(3) Combining these key words to generate ideas;
(4) Defining these ideas and evaluating them from the point of view of the *synthesis* in the phase;
(5) Conducting a research and find a means to improve these ideas from the point of view of synthesis and polish them if applicable;
(6) Spinning the three elements of aufheben;
(7) Identifying new key words for each element for the new thesis and new antithesis;
(8) Generating ideas by combining the key words;
(9) Repeating Steps (2) to (7); and
(10) Undergoing steps (1) to (9) in loop until satisfactory ideas based on points of views with the three elements are found. The three elements can be changed or amended if necessary.

By introducing loop, we can infinitely generate ideas (solve problem (1)) and easily consolidate ideas by applying aufheben many times (solve problem (2)).

III. Related Works

A. Methods for Generate Ideas

"A technique for producing ideas" (James Webb Young, 1940 [1]) is a bible for people in the advertising industry. It says, "An idea is nothing more nor less than a new combination of old elements." However, it never mentions the process of combining ideas with an explanation: "This part of the process is harder to describe in concrete terms because it goes on entirely inside your head." It introduces five steps as follows.

Step 1: gather raw materials;
Step 2: working over these materials in your mind.
Step 3: the incubating stage, let something apart from the conscious mind do the work of synthesis;
Step 4: actual birth of the idea or the Eureka! I have it! stage.
Step 5: final shaping and development of the idea to practical usefulness.

This approach does not elucidate the process of implementing from Steps 3 to 5, whereas the SA method aims to solve a problem using the 10 abovementioned steps.

Another well-known technique for idea creation is the KJ method, which was introduced by and named after Jiro Kawakita. In his book entitled *Hasso-hou* (Abduction) in 1967 [2], the author says that, "This abduction method was originally developed for field research. It is especially true for the issues when trying to let the data speak by itself as an enlightened summary based on the data gathered by observation." According to Kawakita, the KJ method has four essential steps:

(a) label making;
(b) label grouping;
(c) chart making; and
(d) explanation.

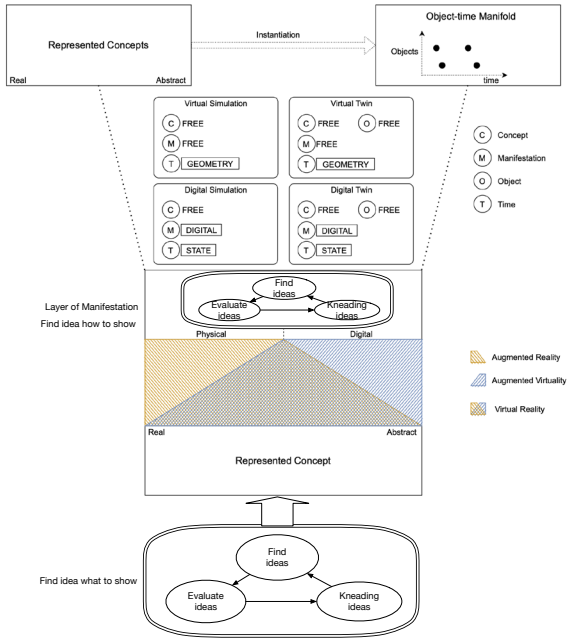

Fig. 1. Extended concept of IoD

nderstanding the KJ method can be conducted using various means: "The narrow-sense KJ method consists of three steps: brainstorming, grouping ideas into islands and writing a conclusion composition." [6], " The KJ method was developed as a result of having difficulties in interpreting ethnographic data in Nepal. The KJ method builds upon Charles Pierce's notions of abduction and relies upon intuitive non-logical thinking processes" [7]. The KJ method is used for variety of issues [8], [9].

Therefore, the KJ method is a helpful tool for understanding complex issues, for thinking through them using charts and language description, and for obtaining clues for ideas. However, as an approach, it does not help people use dialectic development, although a few people are developing software using the KJ method, which is similar to the objective of the SA method [4][10].

The SA method is a unique approach and is extremely different from two abovementioned approaches. In a sense, it helps people generate ideas using the three elements by rotating elements in the aufheben, such that people can combine multiple elements. Dialectic development is frequently used consciously or subconsciously to combine two elements for idea production. However, we realized a third element is always hidden, because people generate ideas by combining two elements. The reason is that people frequently lack ideas based on certain value(s). If the value(s) as an element is counted, then it becomes the third element, because the final ideas that people use must have at least three elements, namely, thesis, anti-thesis, and synthesis. The SA method can be used to consciously generate ideas that revolve around these three elements. The SA method also features kneading processes that utilize analytic hierarchy process (AHP), which is a quantitative decision-making technique that involves multiple competing criteria.

The SA method is similar to the approach suggested in the book *A Technique for Producing ideas*. However, The SA method is different in a sense that it has the utilization of the quantitative decision-making approach of AHP and the qualitative approach by describing to knead ideas consciously and utilizing dialectic development by revolving with the third element.

B. Internet of Digital Reality and Cognitive Infocommunication

Recently, [11] and [12] propose a new concept called IoD. The author explains IoD as follows: "the Internet of Digital Reality (IoD) is a set of technologies that enables digital realities to be managed, transmitted, and harmonized in networked environments (both public and private), focusing on a higher level of user accessibility, impressiveness and experience with the help of virtual reality and artificial intelligence. Connections among various cognitive entities also have to be handled at the end-user level of virtual reality displays and software and at the levels of network protocols and network management, physical media (wired or wireless), hardware interfaces, and other equipment." In addition, IoD is an extension of cognitive infocommunication (CogInfoCom) [13] [14]. CogInfoCom investigates the link of the research areas infocommunication and cognitive science with various engineering applications that emerged as a synergic combination of these sciences. Communication is composed of three components, namely, media, informatics, and communication. CogInfoCom is situated in the region between cognitive informatics and cognitive communication to realize the virtual world.

In the paper [11], page 232, a Figure. explains the key concept of IoD. However, the current study opines that ensuring the effectivity of this framework is crucial. Moreover, providing high-quality and precise ideas to be presented by IoD is important. Fig. 1 displays an extended framework to which we added two parts. One is the bottom of Fig. 1 depicts idea creation as the rotation among idea creation, idea evaluation, and kneading to determine an idea of a presentation using the IoD framework. In addition, the same process is added to the layer of manifestation to determine an idea for demonstrating a concept.

Thus, we propose this idea generation and evaluation process called the SA method. This idea generation method is compelling and applicable to solutions for different problems.

C. Potential Social Impact

Society increasingly requires creativity. "No matter how advanced AI is, humans must have a realm of jobs. That is an ability to produce something from 0. The ability humans need to live 21st century where AI has prevailed is '*Koso Ryoku*', an ability to create new visions where nothing exists" [15]. The SA method can generate ideas According to our definition, visions are also ideas with objectives. If the SA method is enhanced with IoD, it can radically help people generate ideas or visions, which could significantly impact society.

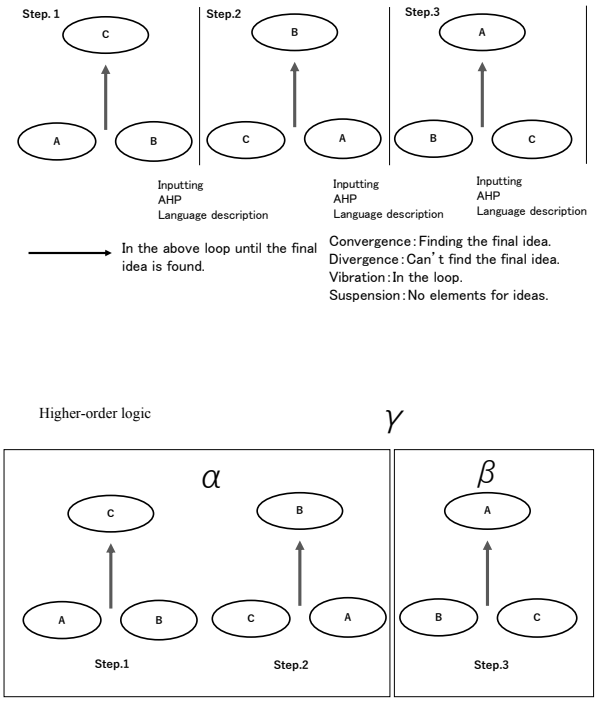

Fig. 3. Bird's eye view of SA method.

IV. Modeling and Implementation

A. Modeling the SA Method

As shown in Fig. 2, the SA method considers three elements, namely, thesis, antithesis, and synthesis, in dialectic development and ensures that each element is treated as synthesis at least once in the process of idea generation. Convergence refers to the "determination of the final idea; divergence means cannot find the final idea; vibration stands for "in the loop"; and suspension denotes "no elements for ideas." "Inputting" and "kneading and language description" are conducted at each dialectic development, and each element is examined.

Fig. 3 presents a bird's eye view of the SA method. Each synthesis from the dialectic development Steps.1 and 2 is used for another dialectic development. Using this dialectic development, "α" is generated as a synthesis. We have another dialectic development with the same elements as those of Step.1 and Step.2. However, in a way, the element for synthesis differs from that from Step.1 and Step.2. Through this dialectic development, "β" is generated as "synthesis." Now, "α" and "β" are used for another dialectic development in higher order. With this dialectic development, "γ" is generated as synthesis. As a result of this process, the final "idea" that incorporates the three elements is generated.

B. Mathematical Model

Fig. 4 depicts the mathematical model of the SA method. The diagram shows that the SA method has two inputs and one output: Input 1 for A, Input 2 for B, and output for C. Each input consists of *N* ideas. By combining them (up to *N* times *N*), ideas are generated in the middle of the process. By selecting ideas, the output is reduced to *N*.

The model has three functions: F1 generates ideas by combining A and B. F2 selects items from the result of F1. Therefore, the number of ideas is reduced from *N* times *N* to *N*. Moreover, F3 is changing the position of each element in the order, for example, from A–B–C to B–C–A.

C. Validity of the Model

Any idea must present multiple aspects, and if the aspects are counted as elements, then any idea is a combination of elements. Therefore, all ideas are pre-existing and are dependent on whether or not humans are aware of them. The SA method is a method for generating ideas, which is a process of finding a usable combination of elements from a pool of possible combinations of elements of which a person is unaware. Therefore, if a sufficiently robust computer can collect all information through a sufficiently extensive network, in theory, then any possible ideas or combinations must be found. If no necessary element exists for any particular idea, then the element is not generated or, accurately speaking, not found yet. The SA method helps people find certain combinations of elements that they particularly need in the scope of their needs. As suggested by the mathematical model, the person is in the loop until it finds the ideas. Therefore, if the person cannot generate an idea, then the combination for which the person is looking does not pre-exist.

D. Implementation using the Analytic Hierarchy Process

Saaty [16] introduced the AHP to solve unstructured economics, social sciences, and management: "The Analytic Hierarchy Process (AHP) is widely used by decision makers and researchers. The definition of criteria and the calculation of their weight are central in this method to assess the alternatives. [17]." Moreover, "the AHP (analytical hierarchy process) method is a method in the decision-making process. This method performs a hierarchical structure calculation where the top level in the hierarchy is the goal to be achieved, then the hierarchy below in the form of criteria in achieving goals, and the lowest level is the alternatives in achieving goals" [18]. It "is appropriate for those fields where intuition, rationality, and irrationality in connection with risk and uncertainty can be found" [19]. Frequently, AHP is used in creative decision-making [20]. Alternatively, even used in the decision-making process of major selection at college [21]. The abovementioned methods for using AHP are within the *decision-making* scope. Against this background, the current study intends to use AHP for two purposes, namely, (1) selecting and (2) understanding ideas better in the sense of specific hints for improvement, which is called *inspirations* or findings. In other words, people can determine whether or not they are happy about ideas while selecting ideas with AHP. Inspirations and findings should then be noted to help in idea generation at a later time.

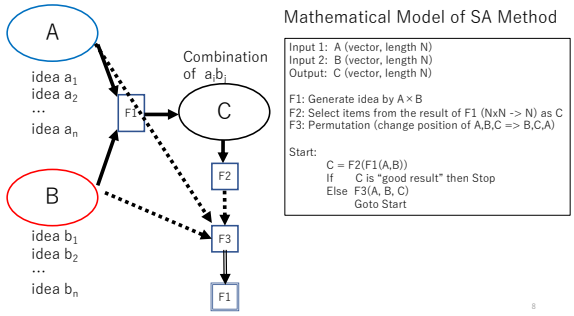

Fig. 4. Mathematical model of SA method

E. Future With the SA Method in IoD Era,

The SA method can create a large impact on society through various means such as education, entrepreneurship, manufacturing, creative work, and even daily life. With the mathematical implementation of the SA method, AI can automatically generate ideas using a few inputs from humans. For example, engineers can easily formulate product ideas using the mathematical implementation of the SA method as they work on vast information network of the Internet. Once the SA method with advancement in IoD (e.g., AI and network) is able to find necessary key words for humans, humans will no longer need to find key words by themselves and select from the list of ideas recommended by the SA method.

V. Cases

A. Sardine Man (*Career Development*)

The study presents an actual case the application of the first author of the SA method for the career development of a student. He taught filmmaking at a specialized training college in Osaka from 2014 to 2016. He began holding a form of online make-up class with two students for two sessions per week. One of them was T (aged 19 years), who dreamed of becoming a screenplay writer. He joined the writer's program at the school year but considered that finding a job would be difficult if he were to stay in the program for two whole years. Thus, he transferred to a movie/drama production program taught by the first author in the hopes of finding a job after graduation. The first author continued to advise him for two years and even one year after his graduation.

The first step: The first author asked him about his dream job, to which he provided a simple answer: "I want to write scripts for a series like 'Ultraman'. Thus, the first author decided to help him make an aufheben happen in a dialectic development using two elements, namely, uniqueness/strength and income. Uniqueness/strength needs to be cultivated, because he was still young and lacked professional skill as a screenplay writer. The first author taught him how to develop a story and write a screenplay. If he could write a professional screenplay, then he could earn an income. In the end, he fulfills a social need; in other words, he contributes to society. This notion was the first plan. However, merely possessing *story development and writing skills* does not make him a

professional writer. As such, the first attempt to make a dialectic development with aufheben did not succeed with the elevation necessary to achieve his goal. At this point, he is only a young man with a few writing skills.

The second step: The first author considered various means to help his student achieve his dream. When the first author was researching on the Internet, he found a video on YouTube about crab fishermen in the Bering Sea. The job is very dangerous but pays extremely well. This concept became the input of the first author as an advisor to his student. He revolved the following elements for dialectic development: social contribution and uniqueness/strength for income. Social contribution should be interpreted as a broad term similar to social needs. The first author assumed that if his student had a similar experience to the crab fishermen in the Bering Sea, then the student could write a sufficiently appealing story. However, as working as a crab fisherman in the Bering Sea was extremely dangerous, the student decided to work as a sardine fisherman instead for one month in Shikoku Island across the tranquil inland sea from Osaka, his hometown.

An aufheben with sufficient elevation did not occur in the second dialectic development. People need to write approximately 50 ten-minute scripts for one year as a practice for being a screenplay writer based on the experience of the first author. In this manner, one can acquire the habit of looking for story ideas all the time and to become very observant. However, the student went to the sardine fishery without having written a sufficient amount of short scripts, because he wanted to find a job. When he returned, he found that he lacked material to write a good story. He failed to gather sufficient information for writing while working as a sardine fisherman. However, he became a young man with certain writing skills and an interesting experience.

The third step: The first author experienced an opportunity to appear in a TV show. In a meeting with an executive of a production company, the first author mentioned the student as "one of his students have some writing skills and an interesting experience with sardine fishery." The executive told him that she wanted to meet him. Now, the student obtained a job at her company as an assistant director. Thus, one could say, "the first author arranged job matching," but the interpretation of this study is different. The student gathered market information through the first author and made the third dialectic development, that is, income and social contribution through his uniqueness/strength.

As of 2022, the student has been with the company for several years. Whether or not he revolves the dialectic development further in his future is dependent on the student. He told the first author that if he has a chance, he wants to try sardine fishery again to add to his knowledge. A probability exists that the student is on his way to becoming a writer through the experience. His nickname at his job is "Iwashi Otoko," which means sardine man. Using the SA method, an idea becomes better with each dialectic development, which is similar to a snowball, as the elements of the dialectic development revolve.

VI. Pilot Project

A. Research Methodology

To determine whether or not the SA method is effective as an application, we conducted a pilot project on 51 participants, specifically 45 third-year students majoring in engineering at Utsunomiya University and 6 first-year undergraduate multinational students majoring in economics at Chuo University. We requested the students to determine their career goals through the application of the SA method. We modified the dialectic development using specific three elements, namely, personal uniqueness/strength, income, and social contribution to revolve as the thesis, antithesis, and synthesis elements, respectively, for each of the three dialectic developments. The participants were provided with a fill-in instruction on Google Forms and a spreadsheet with calculation formulas. We tasked the participants with generating 25 ideas and selecting 10 ideas for each dialectic development. Lastly, they selected three out of 30 ideas based on their weighted sum. The students were given a week to finish their tasks. Afterward, we asked them to answer three questions using a 10-point Likert-type scale and asked them to add their comments to the following questions:

1. Are you happy with the result?
2. Did it help you to have a clearer idea?
3. Do you think you can utilize this method for other purposes apart from determining your career goals?

B. Result

After the project, the 45 students at Utsunomiya University and two out of six students at Chuo University completed the questionnaire. Figs. 5 to 7 represent the responses from the two schools, which were aggregated for the three figures. The figures depict the averages and standard deviations of the scores. The responses of the participants are widely dispersed. Fig. 5 indicates that the average is 6.46, and the mode is 7. Therefore, the SA method relatively led them to the right direction about their career goals. Fig. 6 presents that the average is 5.3, and the modes are 3, 5, and 6, which are widely dispersed. According to the quality analysis, which we will introduce later, a few students experienced difficulty in finding their unique ness/strength, whereas the others understood themselves better. Moreover, certain students conducted their research to understand issues better, whereas others felt the needs to conduct more research. The different responses to the same issues may have created various responses to the questions. Fig. 7 illustrates that the average is 4.65, and mode is 1, which are the lowest average and mode, respectively. We did not allow the students to flexibly change the element, which is the case of the first author did with the sardine man. For this reason, Fig. 7 may have provided the lowest mode.

According to the qualitative analysis of the additional comments, many students expressed difficulty in producing the 25 ideas for each phase, because doing so was time-consuming. Simply put, the number of ideas we requested them to generate for each step was very large. However, a few students reported

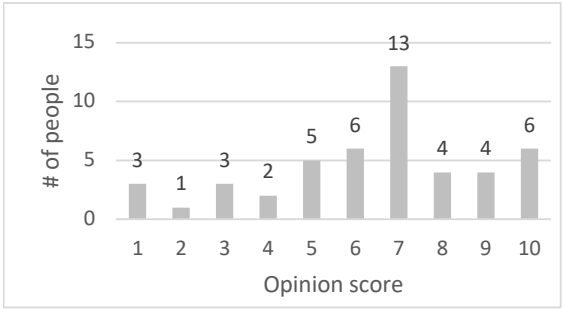

Fig. 5. Are you happy with the result? (n=47)
Average=6.46 S.D.=2.47

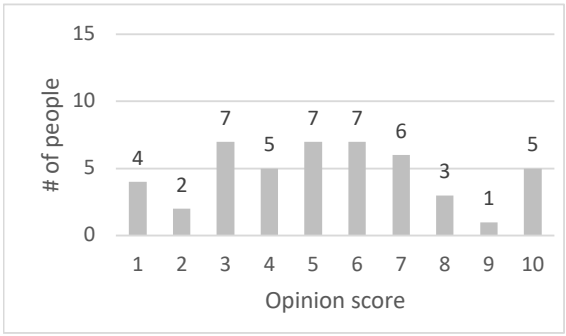

Fig. 6. Did it help you to have clearer idea? (n=47)
Average=5.35 S.D.=2.59

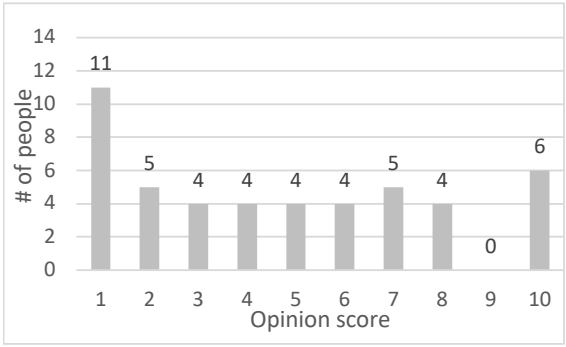

Fig. 7. Do you think you can utilize this method for other purpose? (n=47)
Average=4.65 S.D.=3.11

appreciation for the SA method as a solid strategy for producing ideas and considering issues in a step-by-step manner. The kneading process, which utilizes AHP, is working well, and the decision-making method is interesting for several students. This method helped students expand their list of ideas, and a few students produced career goals that they never previously considered. A few selected these career goals as their final ones through the pilot project. The SA method is very new to all students. For example, one student suggested the possibility of using the SA method for group work. Another student suggested that receiving input from friends, siblings, and parents could be helpful.

VII. Conclusion

This paper presents the outline of the SA method, which is a novel idea generation method for the IoD era. First, we defined two problems related to support tools for idea generation, namely, (1) generate a number of ideas within a short time and (2) consolidate ideas during generation. To solve these problems, we defined the thinking process of the SA method and described the relationship between the SA method and IoD/CogInfoCom. We then presented the mathematical model of the SA method and presented the effectiveness of the method using a case of career development. In addition, we presented the results of the pilot project to extract hidden problems in the application of the SA method for general purposes.

The following points constitute future tasks for improving the SA method.

First, a former professional in the advertising industry developed the SA method for generating ideas for various industries such as film and business. In the advertising industry, idea is everything. People spend billions of dollars on advertisements. Professionals in the advertising industry generate hundreds of ideas overnight for clients. However, the participants lacked experience. Therefore, perceiving that the SA method is difficult to use is relatively natural for them. In this regard, reducing the number of ideas to generate may be suitable for this population group in producing each phase.

Second, we did not provide sufficient research opportunities for the pilot project. If we provided students with comprehensive instructions on how students should conduct research, then the experience may have been different. A well-scheduled instruction design with a phase of research could significantly improve the SA method.

Third, if the students were to work with this method over a longer period, then the experience may also be very different. A career decision is a serious matter for students, who may require more time.

Lastly, the necessity and motivation for students to use the SA method vary according to individual differences. When students need to generate ideas, they may mostly utilize the SA method. The study proposes that the SA method holds a great potential in the IoD Era; however, it is still in its embryonic stage, such that further refinement is required through additional pilot projects on various samples.

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