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Corporate Practices Referencing the W-Shaped Problem-Solving Model and Lessons Learned from Them - The Effectiveness of the KJ Method and What It Does Not Have to Do With It -

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Abstract

This paper focuses on the application of the W-shaped problem-solving model in skeletal-model-product development and the importance of the decision-making process. In the skeletal model business at the company represented by the first author, the process of vision formation is examined in detail, and how the interruption of the decision-making process in the middle of the process caused serious problems later on, which were resolved by reintroducing the decision-making process. Furthermore, the usefulness and limitations of the W-shaped problem-solving model in practice, and the indispensability of knowledge related to commercial activities will be specifically discussed to draw lessons for future practice.

Keywords: Decision-making Process, KJ method, Vision Formation, W-shaped problem-solving model

1 Introduction

This paper discusses the process of product development and marketing of a skeletal model, conducted by a company represented by the first author (FA). Because of the unprecedented characteristics of this product, many people questioned its necessity, and because of our own inexperience in product development and business, many problems were expected to arise.

In starting the project, the FA decided to follow the W-shaped problem-solving model proposed by Jiro Kawakita, a cultural anthropologist, and planned to work closely with the decision-making process in particular. However, for various reasons, the work had to be suspended in the middle of the decision-making process. Because of the extensive and meticulous market research, the project achieved some success, but after a few years, several serious problems arose.

The FA believed that these problems were caused by the interruption of the decision-making process, and five years after the interruption, the decision-making process was reintroduced, completed, and the visioning process was carried out, and the problems were resolved.

This paper details the process and discusses the role and limitations of market research in the FA's business and how implementing the decision-making process became effective.

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2 Related Knowledge

2.1 Kawakita's W-shaped problem-solving model

2.1.1 Kawakita's process model of problem-solving

Jiro Kawakita, a cultural anthropologist, believed that the problem-solving process consists of the stages of "judgment," "decision" and "execution" from trivial problems in daily life to major problems on a national scale.

"Judgment" means to "understand" something well, and it is because one "understands" well that one can proceed successfully. However, according to Kawakita, the process necessary for this "understanding" is generally neglected. People who take action immediately are often regarded as "doers" or "practitioners," but they often fail because they do not include "judgment" in their actions. Therefore, this called "execution," emphasizing that it does not include "judgment." Failure, according to Kawakita, may be due to "decision" or "execution" before things are "understood" well. He states that the development of the decision-making process has been left behind in the problem-solving process until today, and that the KJ method provided the scientific method and practical skills to overcome this situation ([1] p. 40).

When working on a matter, it is not just about "decision" and "execution," but experiencing the whole process of "decision" and "execution," including "judgment," that brings about human growth to the parties involved. Also, when a team works together to solve a problem, the execution of the entire process nurtures the team and fosters a sense of solidarity as a team.

2.1.2 Kawakita's W-shaped problem-solving model

Kawakita's W-shaped problem-solving model (W-shaped model) places "judgment" in the first half of the W-shaped, followed by "decision" and "execution" in the second half. The W-shaped model is structured with the "Level of thought" at the top and the "Level of experience" at the bottom. In the W-shaped model, problem-solving is conducted by moving back and forth between the Level of thought and the Level of experience ([1] p.55) (Figure1).

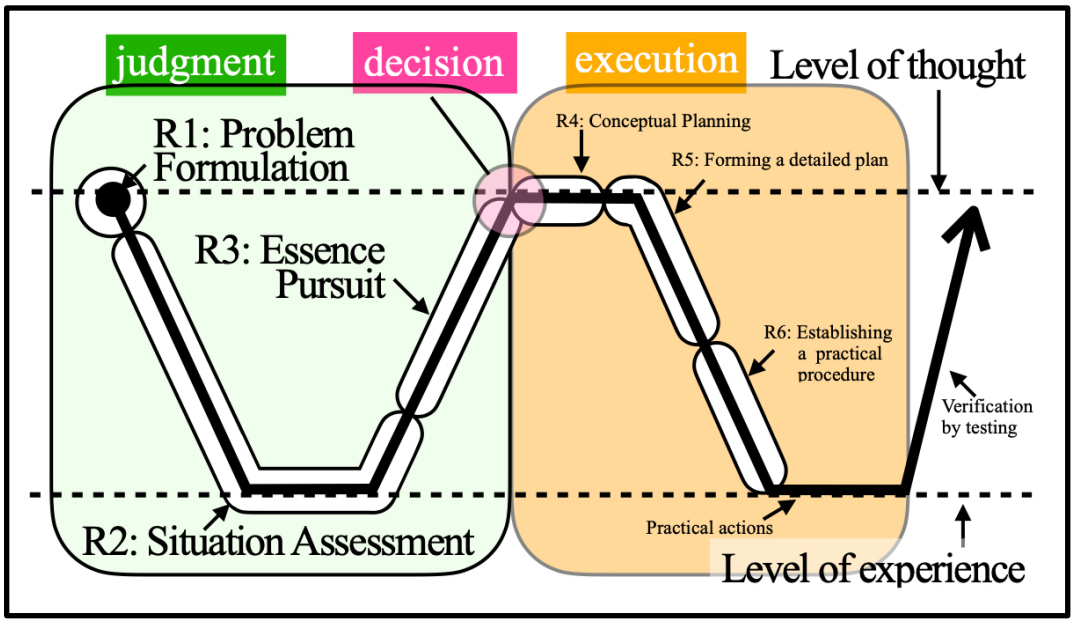

Figure 1: W-shaped model (Based on [1] p.34, p.55, p.368 and [2], the FA drew)

The problem-solving process is further subdivided, and data is collected in each process and summarized using the KJ method ([1] p.368). The "Decision-Making Process" begins with "R1: Problem Identification Round." This round is to discover and confirm one's own awareness of the problem. This is followed by "R2: Situation Understanding Round," in which a survey is conducted to clarify the reality surrounding the awareness of the problem. In "R3: Analysis for Essentials Round," the participants will then explore what exists at the root of the situation in the R2. After the R3, an evaluation of which issues are most important is conducted with the relevant parties. After that, a decision is made as to whether or not to proceed with the resolution of the problem. This is the "decision-making process." At this point, the result of the R3 tends to be pessimistic, which may slow down the decision-making process, so it is sometimes rewritten in a positive way. In this case, it is called "R3.5: Policy Making Round." The "execution process" begins with "R4: Master Planning Round," in which goals are set according to the R3 (or the R3.5). The structured multiple goals are called the "vision," a process of setting and structuring multiple goals, envisioning a world in which the problems of the R3 have been solved. After forming the vision in this way, the process proceeds to "R5" and "R6," which are omitted in this paper.

Each round is based on collecting data and summarizing it using the KJ method. The KJ method is performed cumulatively according to the size of the problem and the timeframe. This is called the "Cumulative KJ method."

2.2 KJ method

The KJ method is a method for summarizing qualitative data and was originated by Jiro Kawakita, a cultural anthropologist. It consists of four specific steps: label making, grouping, diagramming, and narrativization ([1] p. 123).

The first step is "label making," in which each piece of data collected through interviews is recorded on a sticker called a label (Figure 2).

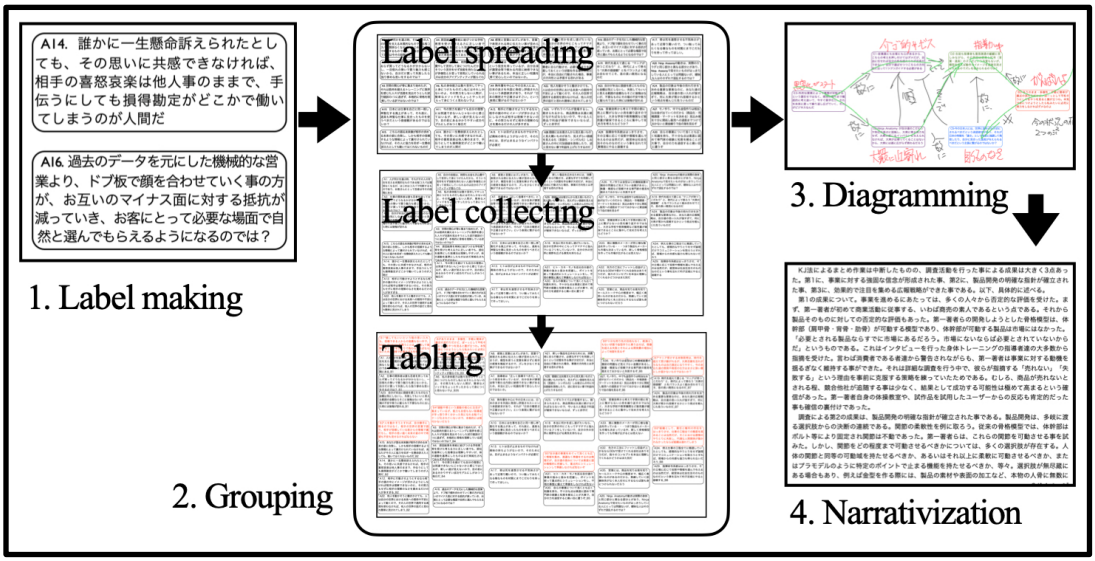

Figure 2: The KJ method's procedure (Based on [1] p.123, the FA drew)

Next, "grouping" is performed using the labels obtained as a result of labeling. Group formation consists of three steps: "label spreading," "label collecting," and "tabling." "Label

spreading" is the process of spreading labels horizontally and vertically. In the next step, "label collecting," the labels are read and those with similar contents are brought closer together. Finally, in the "tabling" section, the labels are clipped together and a summary of the set is created. This consolidates multiple labels into one and reduces the total number of labels.

These grouping operations are repeated until the worker feels that there are no more labels of the same type. It is often said that 5 to 10 labels remain in the end, no matter how many labels were on the original label. Then, a chart is created based on these last remaining labels, considering the overall relationship between them, a process known as "diagramming".

The final step is to create a story by looking at the diagrammatic representation, which is called "narrativization". Narrative may be written or verbal. By narrating, logical connections can be discovered and the meaning and relevance behind the data can be more clearly understood.

3 Implementation

3.1 Background of the adoption of the KJ method for this project

This paper discusses the problems faced by the FA in the business of manufacturing and selling skeletal models. One of the main reasons for this problem was the FA's own preconceptions. Therefore, the FA's situation at that time is described in detail.

In 2014, the FA organized a training workshop to train certain physical training instructors. At the workshop, in addition to physical training instruction, the KJ method was being taught as a problem-solving technique. The FA's intention was to provide participants with a way to solve their own business-related problems by utilizing the KJ method. However, contrary to expectations, the participants in the workshop did not make much use of the KJ method.

This fact inspired the FA with a sense of duty to set an example of the effectiveness of the KJ method. He also took pride in the fact that he had provided all the knowledge necessary to conduct his business (in the training sessions), and he adopted a policy of using as few techniques other than the KJ method as possible. The word "policy" makes it sound like a rational decision, but in essence, it was a personal obsession.

The insistence on the KJ method also had another intention. At the time, the FA had a desire to offer the KJ method itself as a product, in the hope that using the KJ method to help businesses succeed would increase the value of the KJ method as a product.

As a result, the FA overlooked the opportunity to learn the theory and know-how based on existing business practices and clung to the KJ method as he went about his business. He had to read Jiro Kawakita's works, especially "KJ Method - Making Chaos Speak[1]," dozens of times as he worked on his business.

3.2 Development of prototypes and initiation of the "Judgment Process"

The FA has been teaching physical training for about 30 years. He wanted a skeletal model with features not found in existing skeletal models for use in teaching. He had purchased and modified ready-made models himself and asked acquaintances to do so, but was unable to produce a satisfactory model.

In April 2014, the FA was impressed by the quality of the prototype brought by one of his clients, and intuited that "physical training instructors all over the world would want one," and he became strongly aware of the commercialization of the product. Therefore, partly due to

personal considerations (see 3.1 above), he decided to proceed with the project based on the W-shaped model.

The "Dot Memo Hanabi" is a method devised by Kawakita, where notes are taken mainly as dots and are then linked freely in various directions. The name, meaning "Dot Memo Fireworks" in Japanese, comes from the way these connections resemble fireworks, capturing the way thoughts and ideas can be organized and interconnected in a lively yet structured manner. Compared to the KJ method, The Dot Memo Hanabi can be done more simply. In this case, the R1 was completed in about 2 hours (Figure 3).

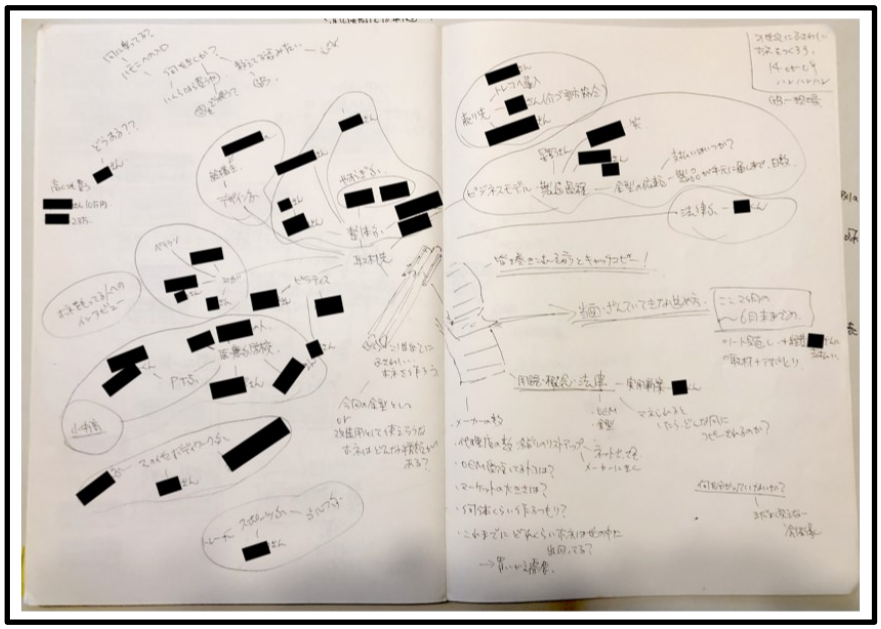

Figure 3: the FA's R1 (The Dot Memo Hanabi) chart

Following the R1, we began "R2: Situation Understanding Round." In this round, data was collected through observation, interviews, and other on-the-ground research, and then summarized using the KJ method to form a narrative. If one focuses on the survey phase, it is similar to a market survey generally conducted, but it is recommended to collect a wide range of data not only on the so-called "market" but also in the R1. Kawakita summarizes this as the five principles of exploration and states them as follows: "Gather qualitative data around the theme (1) from a 360-degree perspective, (2) by stepping stones, (3) without missing any happenings, (4) from things that are somehow interesting, and (5) as qualitative data" ([1] p.217).

The FA conducted a survey based on the guidelines described in Kawakita's literature. The survey was conducted over a six-month period and consisted of interviews and observations. The subjects were seven physical training instructors (yoga, Pilates) ranging from newcomers to veterans, five medical professionals such as physical therapists and orthopedic surgeons, two so-called "Oriental medicine" practitioners (osteopathy, acupuncture, moxibustion, etc.), and two distributors that handle products of companies or rival companies that may become future competitors, Three factories and books related to mold making, three legal experts and those related to politics, five media representatives and salespeople, six managers of large and small companies, plus four craftsmen and professionals who handle "tools," and three physical training enthusiasts, totaling about 40 people, were interviewed and others were observed by participating in lessons. Data from observations, including participation in lessons, were also added. The total data gathered from this survey was 443 pieces.

3.3 Interruption of the "Decision-Making Process" and its impact

In November 2014, we began to compile the survey data using the KJ method, but this was interrupted around December of the same year because the project became too busy. More precisely, the "R2: Situation Understanding Round" was interrupted when the survey was completed and the KJ method compilation process began.

Nevertheless, the project was partially successful because data could be collected from multiple perspectives. The data collected from multiple perspectives was still able to provide a guideline for product development policy and product publicity strategy, which will be discussed later in this section (3.3.1).

On the other hand, there were some data that, although they were obtained as survey data, were omitted from the FA's awareness, or were kept away from the FA's awareness because the business is so busy. It is believed that these were problems that could have been recognized and prevented if the decision-making process had been executed (specifically, if the KJ method work in the R2 had been performed and the R3 had been completed) (3.3.2).

Additionally, there were problems that could have been created due to partial success (3.3.3).

3.3.1 Progress and Partial Success of the Project after Suspension

In December 2014, the FA suspended the KJ method in the R2 and began to establish a sales structure for the developed skeletal model. This phase involved finalizing product specifications, selecting a brand name and logo, launching an official website and social media accounts, and developing a comprehensive sales plan, including target markets and marketing strategies.

Although the KJ method of summarizing the results was interrupted, there were three major outcomes from the research activities. First, a strong belief in the business was formed; second, clear guidelines for product development were established; and third, an effective and attention-grabbing public relations strategy was created. The following are specifics.

Regarding the first outcome, we received negative feedback from many people. First of all, the FA was an amateur in business, engaging in commercial activities for the first time. Then there was the negative evaluation of the product itself. The skeletal model that the FAs were trying to develop was a model in which the torso (shoulder blades, spine, and ribs) was movable, and there were no products on the market with a movable torso. "If there was a need for such a product, it would already be on the market. If it is not on the market, it is because it is not needed." This was pointed out by the majority of the physical training instructors interviewed. Despite the warnings of their so-called consumers, the FA was able to maintain an unwavering motivation for their business. This was because, in the course of detailed research, he had devised a strategy to overcome in advance the reasons that they pointed out as "no sales" and "failure." Rather, they were convinced that the more difficult it was for a product to sell, the less likely competitors would follow suit and, as a result, the greater the likelihood of success. The positive response from the FA's own gymnastics classes and from users who had tried the prototype also supported this belief.

The second outcome of the study was the establishment of clear guidelines for product development. Product development is a series of decisions involving a wide range of options. Take joint flexibility, for example. In conventional skeletal models, the torso is fixed with bolts, etc., and its joints are immovable. The FAs attempted to make these joints movable. However, there are many options as to how far the joints should be movable. Should they have a range of motion equivalent to that of a human joint, or should they be more flexible than that, or should they have the ability to stop at a specific point, as in a plastic model? In some cases, the choices are

inexhaustible; for example, when making a mold, which of the myriad holes in a real human bone should be kept and which ignored, what color should be used, etc., in terms of the product material and surface treatment. When conducting interviews, it was common to receive requests to "make it like a real human body." However, it is not sufficient to create models "just like the real thing," as the requests. For instance, there is a component in the pelvis called the "sacroiliac joint" that only moves about 1 mm. Some experts believe that the way this joint moves is of utmost importance. Since the FAs' skeletal model is half-scale, creating this joint "just like the real thing" would mean that the joint only moves about 0.5 mm. If it only moves 0.5 mm, the person handling the product will not be able to confirm that the joint is moving because its range of motion is too small. First and foremost, considering that each person's body has a different range of motion, there is the question of whether to allow extreme movements, such as those of ballet dancers, or whether to express the range of motion of people with disabilities. Thorough research activities have been extremely beneficial when it was necessary to set a direction (Figure 4).

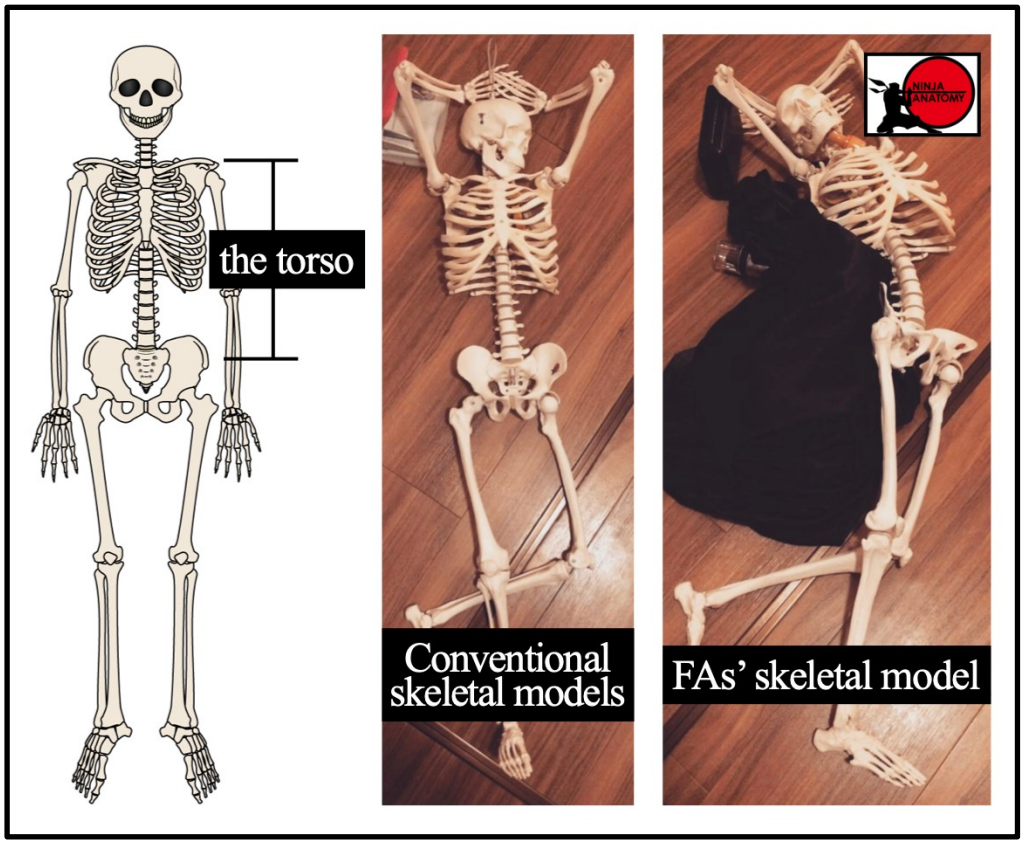

Figure 4: The conventional skeletal model's torso is static. (Both images use the FAs' model to mimic it.)

The third achievement was the creation of an effective and attention-grabbing public relations strategy. The FAs began selling their skeletal model for ¥150,000 ($1,000). The industry of physical training instructors, which the FA and his colleagues have defined as their target clientele, includes various schools of yoga, Pilates, bodywork, and Western and Eastern medical practitioners. Although each school has expensive equipment within that school, it is rare to find equipment that exceeds $1,000 that all schools use in common. In other words, it was considered that there was no custom to spend the equivalent of $1,000. Furthermore, considering that skeletal models made by other companies were sold for ¥20,000 ($130) to ¥30,000 ($200), the strategy

of how to publicize an expensive product with unknown tools was important. After conducting research, The FAs finally adopted the phrase "a work tool used by body professionals" as their catchphrase. The FAs knew that for physical training instructors, $1,000 is a large investment, but it is not that uncommon in other industries. For example, we found that hairdressers use about five pairs of scissors priced at ¥30,000 ($200) - ¥50,000 ($330) and replace them every few years, and that haute couture craftsmen spend ¥200,000 ($1,300) - ¥300,000 ($2,000) for their sewing machines. The message behind the product was that "Professionals should invest a certain amount of money in their tools, and our products are the right tools for the job."

The product was named "Ninja Anatomy - a skeletal model for the 21st century." The name was coined from the words "Ninja" and "anatomy." Through our research, we found that Japanese physical training instructors place more importance on the recommendations of their teachers than on their own judgment when selecting products. They traced the roots of their mentors to their mentors' mentors and their mentors' mentors to their mentors, and in many cases, they ended up with Western mentors. By incorporating the symbolic image of "Ninja" into the product name, the company sought to increase awareness of the product in overseas markets.

The design of the product logo was chosen to look old-fashioned at first glance, rather than to be innovative. The reason is that through our research activities, we found that consumers have a medical image of skeletal models. Because the FAs' firm lacked medical credentials, they felt it necessary to ensure credibility for their product. Therefore, we took the logo design of a foreign film company as a reference. We adopted an image of scale that seemed to be a global standard and a "familiar design from the past" that we had seen somewhere before.

These three results are events that the FAs felt strongly about the value of their research work. The publicity strategy that fully incorporated the product name and catchphrases, "Ninja Anatomy-a skeletal model for the 21st century" and "a work tool used by instructors of the body," proved effective. Some customers who purchased the product came to meet with the FAs in person to discuss the physical theory with them, some modified the product to suit their needs and sent them videos of the modification process, and some even donated the modified product itself to the FAs. Some of the modification ideas were so brilliant that the FAs used them as a guide for modifying their own products. The FA believes that this kind of exchange occurred because the product was designed for professionals.

3.3.2 Problems caused by suspension

Although the skeletal model project was partially successful due to the data obtained from the survey activities, there were some problems caused by the interruption of the decision-making process. First, the formation of a vision was hindered, and second, the author lost the opportunity to correct biases and omissions in his perception.

First, the overall business policy and vision were not clearly defined. The product strategy and development policy had already been finalized, but the overall direction of travel for the business had not been clearly defined. This problem made the FA's own actions ad hoc, which affected the entire team and caused members to lose sight of what their roles were. One member said, "I want to help you, but I don't know what exactly I can help you with. You seem to be acting alone". This indicates that he was unclear on what he should base his actions on.

As the business leader, the FA had the responsibility to clearly state the future vision that the entire team should aim for, and the lack of such a vision led to poor performance by the team members. This was especially true when major failures occurred, such as the failure to develop molds. The most serious impact of the interruption of the decision-making process was the failure to produce a vision for the business.

However, even tentatively, the FA did not set a vision or long-term goals for the business because he believed that a vision and long-term goals could not be set without considering many factors and aspects. Although the FA assumed (3.3.3) that he had an overall picture of the problem, as described below, at the same time he felt that he might have missed something important by interrupting the decision-making process. Therefore, it was difficult for them to clarify their specific vision and long-term goals.

Second, as mentioned earlier (3.1), due to the FA's insistence on using methods other than the KJ method as much as possible, opportunities to learn theories and know-how based on existing business practices were lost. Typical examples include accounting, numerical management, and contracts.

The FA neglected the importance of these areas and avoided the opportunity to acquire this expertise, resulting in ambiguity in the calculation of various costs and several difficulties in cash management. Specifically, with regard to numerical management, the company lacked the knowledge essential for basic business strategy, such as the time and quantity required for a newly manufactured product to turn a profit, the risk of failure in making a mold, and so on.

In addition, because the company adopted a policy of omitting the drafting of contracts and forming agreements through discussions on a case-by-case basis, unexpected problems arose. In terms of business practices, matters that should have been proceeded with based on a written contract were discussed with each other on a case-by-case basis, which resulted in time-consuming decision-making. Furthermore, disputes sometimes arose when sufficient time could not be allotted for discussion. In many cases, the basis for each side's situation was emotional, and matters that had once been decided on became an issue again, and the same arguments were repeated.

For example, the case of an application for a utility model. The developer argued that since he had developed the product, he should be the applicant for the utility model. On the other hand, the FA argued that the company should also be named as an applicant because it was the FA's company that paid the expenses. There was not enough time to discuss the issue, and to avoid a dispute, the FA advised the developer to make the application himself instead of stepping down as the applicant. As a result, the developer was unable to complete the paperwork himself and could not file the application.

In a different case, the manager in charge of the manufacturing department and the FA, who was mainly focused on sales, had different views on how the business should proceed, which could have disrupted the unity of the organization. Therefore, the FA chose to delegate the management of the business to the manager in charge and to step back from the management of the business.

However, although this manager was well versed in the manufacturing department, she did not have the time or inclination to get involved in the sales department, and as a result, sales declined and the company's financial situation became difficult.

Due to his insistence on not using methods other than the KJ method as much as possible, the FA's vision was narrowed, and he overlooked the importance of basic business tools such as counting control and contracts, resulting in inconvenience to the other party and detriment to the company.

3.3.3 Problems caused by partial success

We've already noted that the research data yielded partial results (3.3.1), but this success created a false perception in the FA that he grasped the entire problem. The FA is inherently skilled in defining product development and PR strategies, and the survey data reinforced this, yielding results.

However, this has resulted in a lack of awareness of the areas in which they are weak and a delay in implementing countermeasures in those areas. The most typical failure was in the mold making of the lower body part (from the pelvis to the toes), which started in December 2016.

In making this mold, we also conducted interviews with foot experts. This survey was conducted with highly specialized people, including ballet dancers, running experts, and shoe manufacturers. As a result, the lower body part model developed by the FAs was specialized for the specific professionals and specific applications that were the subject of the study. This development was fully in line with the original public relations strategy of creating a "professional work tool" and resulted in a product that the FAs sought.

The new product was well received by the professionals surveyed. However, it was difficult for many general instructors to use. For the average instructor, it is often more important to be able to handle the product roughly in the field and not have it break, rather than to explain the delicate structure of the foot. Therefore, there were frequent situations in which the elaborate but delicately made ankle joint models were broken by moving them with brute force.

This indicates that we have overlooked the viewpoints of ordinary users as a result of developing products for specific professionals only. We believe that this failure was caused by the FA's misperception that he understands consumers.

3.4 Reintroduction of the "Decision-Making Process" and its effects

3.4.1 Background leading to the reintroduction of the "R2: Situation Understanding Round"

In February 2019, five years into its operations, the company may have been viewed by outsiders as growing steadily. In fact, the product, which was heavily criticized at the start of the business with no one buying it, has grown to the point where a cumulative total of 1,000 units are expected to be sold. The team that had started with two developers and the FA had grown to ten people, and the company had succeeded in obtaining various subsidies and had begun to do business with factories that were in the tens of millions of yen (the hundreds of thousands to low millions of US dollars) with its clients.

However, behind these superficial successes, the business was facing a difficult phase due to the three main problems (3.3.2 and 3.3.3) mentioned above. The mold making project, a significant invest for us had been invested, was halfway to commercialization and the company was faced with the choice of either spending additional money to complete the project or abandoning the molds. At the size of the FAs' business, both options were approaching the limits of their resources and capabilities.

Every meeting became a place of bickering and cacophony, and intra-team conflict became a daily occurrence. Even key staff members began to express their desire to leave the company. With no vision in place, the business lacked a goal for overcoming difficulties, and the direction in which it should go was lost.

A gap in awareness became apparent within the team regarding the direction of the business. Some members of the team expressed that a business large enough to sustain their own livelihood was sufficient. On the other hand, some members wanted to challenge the global market. Others insisted that they wanted to be active in product development, while others argued that they should suspend development activities and focus all their efforts on improving customer service.

At this stage, the FA himself was aware that there were problems occurring that he had not been able to grasp, and he was not certain about specific measures to improve the business. Even

if he had actually set out a direction, he was in such a state of confusion that he could hardly imagine that it would be accepted by all concerned parties.

The FA, who had lost sight of the direction of the project and was at a loss as to what criteria should be used to make a decision, decided to resume the decision-making process that had been suspended. Since the decision-making process had been interrupted during the R2, the process was restarted by summarizing the survey data using the KJ method.

This decision was not a positive one; it was a hard-won decision in a situation where no solution was available and no other appropriate option was seen for the FA. The FA prided himself on having some understanding of the full survey data, and the situation was different from the current situation (obtained more than four years ago), and the data may even be outdated. Nevertheless, it was a difficult decision with no other appropriate option for the FA, who did not see any basis for it, as he was forced to make a decision on the future course of action.

The FA declared to the staffs: "I think the direction of our project should be based on the results of the earlier but interrupted the R2. In the interrupted the R2, the survey had been completed, but it was not summarized using the KJ method, so the analysis and discussion were not thorough enough. Because of the interruption, we were unable to determine the direction of the project, and I think that is what is causing our confusion. Therefore, regarding the direction of the project, I would like you to resume from this R2 and wait for the results of the decision-making process."

3.4.2 Reintroduction of "R2: Situation Understanding Round" and Its Effects

In February 2019, the FA illustrated the survey data using the KJ method and converted the "index chart" into text. In cases where there are a large number of data, such as in this instance, it is common to compile all the data and create a chart that serves as a table of contents, referred to as an "index chart." During this process, the FA came to believe that he might have been able to prevent unexpected problems from occurring if he had completed the "R2: Situation Understanding Round" at the beginning of the project. This is because, in the first place, the survey data contained a number of data that foreshadowed the problems that were being faced in the business

Table 1: Data for Anticipating Problems Faced in Business (the R2)

Data that foresee the first outcome (FA misjudged his customers' needs and created a niche product.)	- Shouldn't he target the mass 80% over the niche 20%? Do the joints need such fine movement? - Slot cars became mania before the beginners grew up to the bottom, and the boom was declining. - Ignore enthusiasts focused on details; they won't buy. Better to target the masses.
Data that foreshadows the second outcome (data highlighting the importance of theories and know-how in existing business practices (regarding counting and control))	- Make a trial balance before the business. - Sales is about getting the contracts and the cash, you know? - Only after you sell the product and collect the money can you call it a product. (On contractual issues, etc.) - Be very contractual. Even if you're a novice, maintain firmness regardless of your close relationships. - Business is no joke! Be careful! In contracts, be devilish at every stage..
Data that foreshadows the third outcome (the importance of policy-making)	- Entrepreneurs are charismatic and everyone is willing to risk their lives to help them. - The supporters of Mr. A's school want to bring out everyone's expertise in order to fulfill his wishes.

at this time (February 2019). For example, the data set foresaw the occurrence of the three aforementioned problems (3.3.2 and 3.3.3) (Table 1).

The FA erroneously assumed that he knew his customers (3.3.3), but then asked, "Shouldn't you aim for the mass 80% instead of the maniacal 20%? Do we really need to move the joints that finely?" If the FA's opinion "I'm not a fanatic" had not been far from his consciousness, he might have avoided making a maniacal product. The FA underestimated the importance of financial management, but he might have been able to stabilize his financial situation if he had not ignored the data that "make a trial balance before you start a business" and "a sales person is only as good as the contracts and the cash he can get."

The information obtained from the interviewees represents important insights and empirical knowledge. These were unanticipated issues for the FA, but were anticipated in the survey data. However, due to the FA's pre-existing knowledge and biases, this information was overlooked; had the KJ method of summarization been used, these data could have been placed in their proper context and the perspectives missed by the FA could have been incorporated. However, because the R2 was interrupted, these important points were missed.

The FA presented the results of the R2 to the team members. At the same time, the FA apologized to the team members for the confusion that had arisen as a result of the FA's lack of understanding of the overall picture of the project (Figure 5).

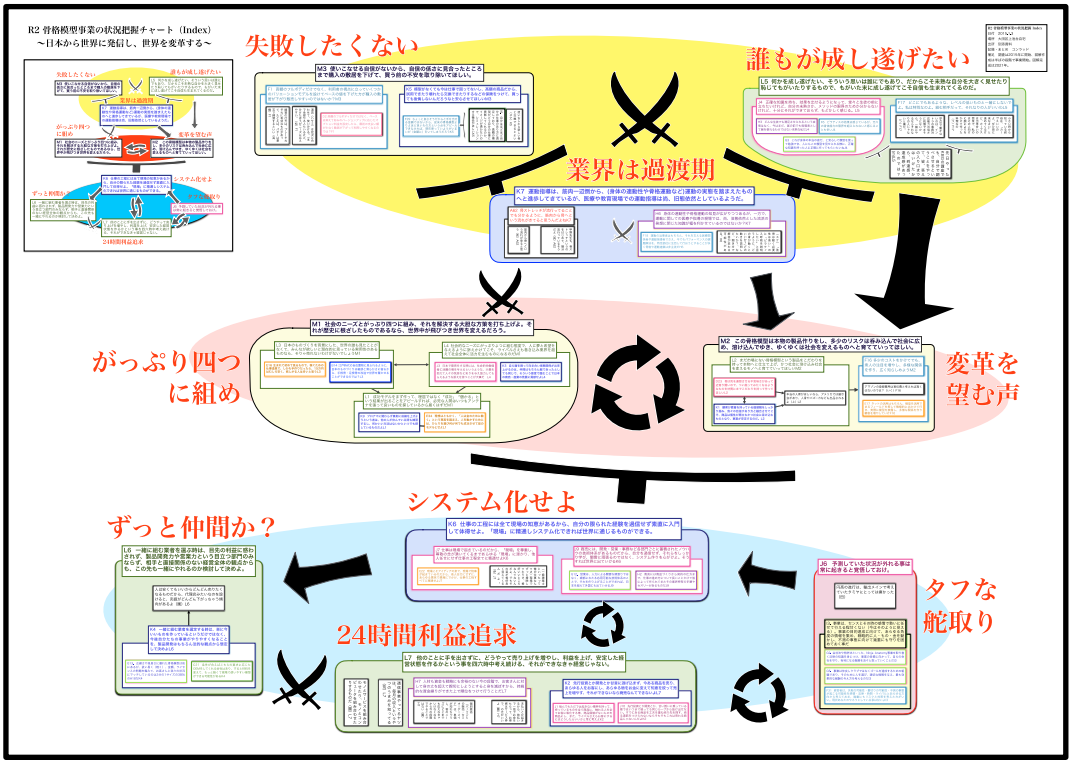

Figure 5: The R2 (created based on 443 labels) (Index chart)

The FA's apology may have come as a surprise to the staffs, given the frequent confrontations that had occurred in the past. Even those staff members who were initially perplexed by the FA's attitude began to express their opinions about the survey data. Generally, their reaction was that it was exactly what they felt it was.

The resumption of the R2 allowed the FA to clearly understand why he had failed. Then, with the help of experts, he began learning to manage the counts. At this stage, however, it was difficult for the FA and his staffs to have immediate confidence in their ability to improve the business.

The FA was so determined to move on to the next "R3: Analysis for Essentials Round," that he asked the staffs to give him more time to decide on the direction of the business. This was because the FA believed that no policy could be made without a deep understanding of the problem himself, and also because he wanted the staffs to be more aware of the importance of this data. Just hearing a presentation organized by the FA using the KJ method may seem like someone else's problem. Therefore, the FA thought it was important to incorporate their opinions when creating the policy.

3.5 Introduction of "R3: Analysis for Essentials Round" and its effects

In "R3: Analysis for Essentials Round," discussions were based on the KJ method chart from R2. Specifically, the focus was on "What are the essential issues behind the phenomena in this R2 chart?" Kawakita described the criteria as "only when an issue that makes us want to slap our hats and knees, we label it" ([1] p.399).

Participants included the FA and his staff members, as well as advisors from the client's factory and subcontractor's finance, as appropriate. The discussions were held three times a week over a two-week period, lasting about 90 minutes each time. Using the 36 opinions obtained during this process, the FA summarized them using the KJ method, created a KJ chart, and presented it to the staffs. Additionally, the FA created a chart (the R3.5) where all the labels in the R3 have been rewritten to be positive. This chart was then voted on for importance by the staff (Figure 6).

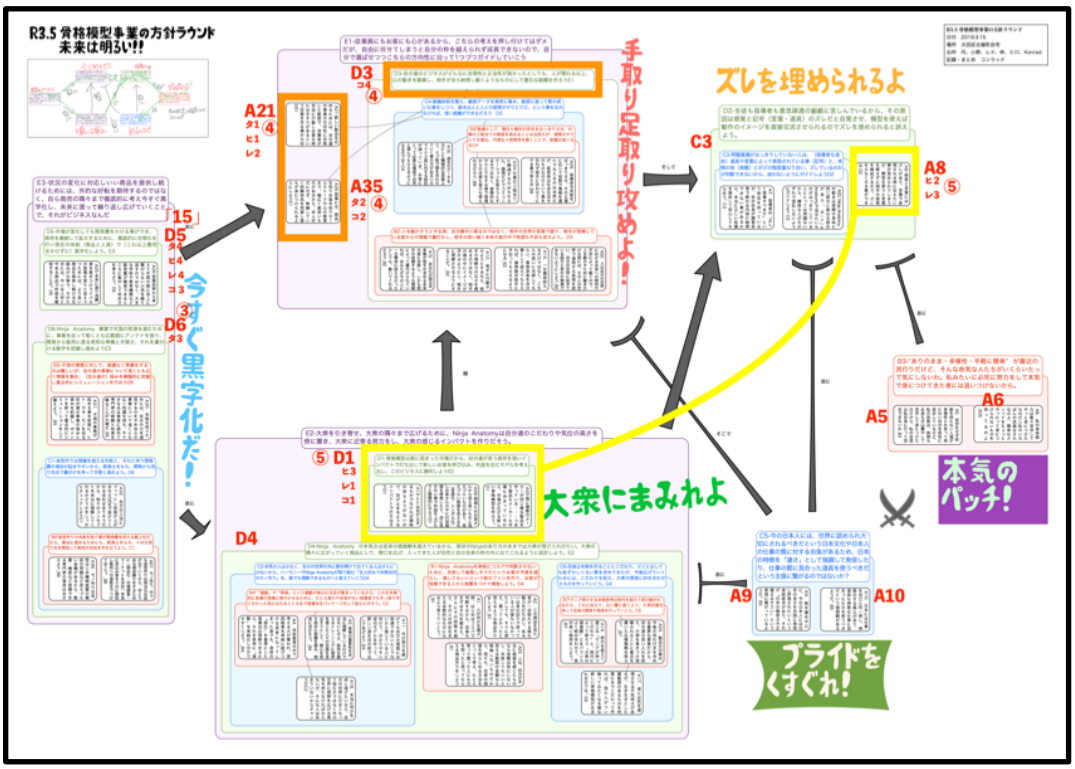

Figure 6: The R3.5 chart based on the R3. The staffs voted on key elements.

After the R3, the business policy was established and an organizational chart was created that took into account the characteristics of the staff.

The staffs gave positive feedback that the direction of the project and their own roles had been clarified. The staff members commented, "It was as if we had a constitution, and now we can talk to the president as equals." "By letting go of our own pride and adopting a policy of being close to the customer's site, we were able to narrow down the issues, making it easier to deal with the customer."

It also created empathy and understanding within the team. The following comments demonstrate this. "Every time we hit our knees, it felt like we were all on the same page."

Still, not all reactions were positive. Some staff members called for a shift to concrete action. One staff member put it this way. One staff member said, "It's important to put things into words and share them, but if we can't put them into action, I don't see the point."

Overall, however, the focus rounds seem to have had the effect of setting policy, easing tensions within the organization, and improving the self-awareness of the staffs. In July 2023, we interviewed staff members and received the following comments: "Before, all the staff members were tense, but now they are calm and focused. I started to think about it. Before, I was waiting for instructions," etc. Furthermore, the comment, "I was in a hurry because I thought I had to make a change, but I didn't know which direction to go, but I calmed down," indicates that the R3 gave the staffs a sense of direction, which in turn promoted stability in the group.

3.6 Introduction of "R4: Master Planning Round" and its effects

"R4: Master Planning Round" discussions proceeded in a congenial atmosphere. The vision for the project was clearly discussed at this stage, and the momentum that "change (improvement) is finally coming" increased throughout the entire project. With this vision as the axis, the direction of the project was set and "where to start" was decided. The project entered the stage of seeking specific improvement measures. Through this round, discussions became more concrete, and strategic efforts to solve problems based on the vision began.

4 Discussion

Based on a specific case study of a skeletal model project, this study examined in detail how the execution of the decision-making process (R1-R3.5) of the W-shaped model affected vision formation.

In this case study, the decision to proceed was based on Jiro Kawakita's W-shaped model. However, after conducting the "R2: Situation Understanding Round" survey, it was suspended due to insufficient time for data organization and analysis. Although the project had partial success from this survey, years later it faced several unforeseen problems, capable of derailing the entire project.

As we resumed the R2 and compiled the survey data, we discovered that the information anticipating such problems was already present in the survey data. In other words, these important data had been overlooked by the FA's own biases, preconceptions, and stereotypes, even though they had been pointed out to him by interviewees. How can practitioners recognize, understand, and accept the issues they overlook due to their own biases, preconceptions, and stereotypes? In this particular case, going through the decision-making process of the W-shaped model demonstrated to be effective.

The FAs were able to create their vision for the project by resuming and executing the decision-making process from the R2. Through this case study, it was suggested that the vision of the

business could be formed more clearly and appropriately by going through the decision-making process of the W-shaped model.

On the other hand, there were many important problems in this case study that stemmed from the fact that the FA and his colleagues had not learned the theories of commercial activities. These problems suggest that adopting the W-shaped model alone may not be sufficient for business practice, and that acquiring knowledge related to commercial activities may be essential.

For example, there is a biodesign human resource development program developed based on design thinking. This program is oriented toward practical human resource development programs for medical device development, but it also includes a process of steps from needs exploration based on on-site observation, concept creation, and commercialization, as well as knowledge and skills necessary for commercial activities, such as business planning and finance [3]. Referencing these as well will make the W-shaped model more useful in practice.

5 Conclusion

In this study, we detailed how the execution of the W-shaped model's decision-making process (R1 to R3.5) influenced the formation of vision, based on a specific case in the skeletal model business. We emphasized the importance of not only the analysis of market research data after it has been obtained, but also the essential considerations based on the results and the importance of decision-making through the participation of all staff members. The results showed that the appropriate use of market research data, as well as deep discussions and joint decisions by the entire team, were key to improving the clarity and appropriateness of the vision.

However, since this insight is based on a specific case study, further case studies and exhaustive validation are required to confirm its applicability in other industries and situations. Future research should focus on case studies from different industries and business stages and explore in more detail how the use of market research, intrinsic considerations, and team decision-making contribute to vision formation.

Acknowledgement

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