Research Article

A Design Thinking Technique of Letting Problems Solved by Self

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This paper puts forward the thinking mode of problems solved by self, which can turn complaints into wishes that resembles needs beyond user’s expectation and imagination. Inferring the framework for solving problems from existing problem materials, the proposed technique employs literal logic to manipulate mathematical strategies, so that rational thinking can guide the development of affectional contexts, and automatically generate solution concepts, systematically and systemically. Through the demonstration of a design case study and comparative analysis of the effectiveness of related creative techniques the feasibility, novelty, advancement, and practicality of the proposed model are verified. The proposed tool can assist its users to think outside the black box and create “needs that adopters yet to aware.”

1. Introduction

The well-known sentence “The only constant in the world is change” [1] points out that the essence of knowledge innovation from the past to the future is the pursuit of innovation and change. “Change” is often regarded as a “problem,” while the essence of “innovation” is “seeking change,” compared with normality and stability [2]. Therefore, innovation has also become a “problem” to be solved.

Another annoying language of “Think outside the box” is often heard, when encountering difficult problems [3]. The “problem” is considered as the “inertial thinking framework,” limiting the creation development, so how to break the inertial thinking framework has become the crux and dilemma of many scientific research. Patent is one of the important indexes for calculating the achievements of many scientific research projects [4], so that many scientists have summarized and developed theories, technologies, methods, and tools for developing innovation, such as TRIZ method, based on patent big data [5]. The logic of “induction” is to find out the basic or common law inference mode from the existing knowledge materials or experience affairs, so the problems of experience innovation or emotion design cannot be solved.

Scientists rely on objective data calculation and experimental methods to create scientific research achievements, and artists mostly rely on intuitive understanding and personal life feelings to create art. Designers are between the two and should consider the operation of enterprises with the highly compound and complex problems treated and more serious “framework” trapped [6]. If we only summarize the innovative thinking methods required by designers from the perspective of scientific objective or understanding experience, it is easy to fall into the trap of “existing framework.” Therefore, it is necessary to find another perspective or different thinking modes to seek breakthrough.

Design is often defined as “a purposeful creative behavior” [7]. If the purpose of creative behavior is to develop a high innovation with unstable purpose, design itself has become an unstable or undefined activity. In addition, design is defined as a kind of “mean to solve problems” or “mean to meet user needs,” so as to clarify the purpose of design activities [8]. However, the consumers are difficult to point out their adoption needs clearly in today’s market environment where supply is much higher than demand with more emphasis on “unprecedented” innovative experience [9]. Owing to “not having,” it is “hard to say,” which makes it difficult to effectively extend the design means to
solve problems for customers, so even the enterprise customers who entrust design innovation themselves are difficult to grasp the dynamics and changes of users' needs.

The study aims at analyzing the ways of thinking and types of feasible strategies to solve problems, establishing conceptual framework that can break through the framework, and develop a thinking technique of letting problems solved by self from the dilemma of inertial thinking framework, so as to verify the feasibility, practicability, progress, and other related characteristics of the proposed model and method through case analysis.

2. Problem: Inertial Thinking Framework

People will habitually use the previously acquired knowledge or experience framework to solve the difficulties when encountering difficulties, and when the difficulties cannot be completely and mostly solved, they are called "problems" [10].

Because people do not know how to solve the problem, and it sometimes is more difficult to confirm that the faced problem is a complete and core problem, seemed to be trapped in "problem space" [11], a designer or problem solver who claims to be a problem solver empathically replaces the trapped, who may be enterprise customers, product users, or any individual or group seeking assistance and find a way out, and the problem solver is a broad definition of professional skills, which can be engineers, lawyers, accountants, designers, and other people with different functions [12]. Therefore, the problem solver is in the problem space, trying to find a way out for the trapped, and creating all kinds of tools or solutions conducive to extricating or improving the difficulties through various technical methods according to the attributes of individual problems.

The above situation is mainly composed of four components: problem space, difficult problems, problem solvers, and conciliators. The problem space consists of known problems and hidden problems; difficult problems refer to currently known problems that are temporarily defined and yet to be solved; a rescuer means a trapped person or a rescuer entrusted by him; conciliator refers to all kinds of extreme value test.

The final calculation result of the problem is assumed as Y to multiply with itself to reduce the complexity of the formula to achieve 2 + Y = Y^2, and then two sets of solutions Y = 2, -1 in Y^2 - Y - 2 = 0 can be achieved. Because the value in the root sign is greater than zero, the imaginary root of negative number is excluded to leave the only positive solution, and there is no need to use extreme value test. From the answers to the above two questions, it can be found that the question itself can provide clues and relevant help. Working with questions makes it easier to get answers. The above strategic thinking of solving difficulties is analyzed to summarize the operation induced as follows:

(1) When defining a problems, we should look at the appearance and explore the "hidden problems."

(2) When deducing the meaning of the question, we can "assume the question is the answer."

(3) In problem-solving skills, we can enlarge the problem, eliminate the interference of details, and focus mainly on the core answer.

(4) In terms of problem-solving strategy, we can skillfully use the "virtual solution" accompanies the hidden problems.

(5) When confirming the answer, use the "extreme value" test with caution in order to achieve completeness.

(6) When one side of the equation is a simple value of 0 or 1, the answer is ready to come out.

(7) In symbolic meaning, the equal sign can be regarded as intermediary medium.
(8) Practicing math problem solving is in fact learning “strategic thinking.”

According to the above gist, taking the innovative thinking of C3 solution strategies as the core, integrating the advantages of other solution strategies, this paper puts forward the “difficulty solving mode of transforming difficult problem resistance into obtaining solution assistance,” which is called as “problems solved by self.”

Since the advent of information technology, the boundary between natural science and social science has gradually blurred [16], and the natural grammar model can be adopted for algorithm and program transcription, while robots are gradually endowed with artificial intelligence and “artificial humanity” [17]. Aesthetic feeling can also be described by digital, and it appears in the field of Kansei engineering [18]. In the past, the two major scientific thinking with different properties, respectively, focus on the expression and deduction of qualitative and quantitative and will gradually become two sides of combining two into one and integrating into a whole [19]. Therefore, the ideal solution model should also take into account the thinking needs of two different sciences and gradually form a new system view or scientific paradigm.

### 3. A Design Thinking Technique of Letting Problems Solved by Self

Most of the problems in life or work have high multiplicity and complexity [20]. Here, “problem” is defined as “a combination of various dissatisfaction attitudes surrounding a specific core problem.” Dissatisfaction may come from explicit complaints or implicit doubts. Doubts are often hidden but not obvious, so they can be regarded as “hidden problems” that jointly constitute the problem space. Complaints are explicit and easy to observe. The implicit doubts can be known only after in-depth investigation and finally appear in explicit form. In order to facilitate the discussion, it is assumed that the doubts are known through investigation, and the doubts are integrated into the complaint discussion. The problem can then be defined as “the complaining combination of a group of complex (n) items with time order or logical context” formula.

\[
P = \sum C_i, i = 1 \sim n.
\]

In order to reduce the difficulty of problem-solving or increase the effectiveness of teamwork, each complaint can be solved or improved one by one. Therefore, through the way of “assuming the problem as the answer,” the “transformation” function of the equal sign and multiplication is skillfully used, just like the negative number on the left side in mathematics. After moving across the equal sign to the right, it will be transformed into a positive number or multiply itself by square and remove the annoying root sign, so as to “turn resentment into wish” to solve many difficulties. “Transformation” can be any verb related to “change and become,” whose main role is to redefine the problem, eliminate interference details, focus on core clues, and generate favorable solution strategies to facilitate quick
solution. “T” refers to transformation, and output of “complaint” is “expectation.” Through the transformation mechanism, the “expectation” towards positive development can be generated from the negative “complaint” formula.

\[
\sum C \cdot T = \sum E.
\]

The key transformation mechanism words of “change and become” have essential differences in the meaning of Chinese characters. “Become” mostly refers to the change from one nature to another, belonging to a qualitative change or innovation, and tends to be the logical concept of “nonoriginal” or “qualitative change” in Chinese word meaning. Relatively speaking, “change” mostly refers to the transformation from one type or structure to another with similar essence and different expression forms. It focuses on the improvement and change in degree or quantity. In solving problems, it is similar to concepts such as reducing shortcomings or narrowing the gap with the target value and solving problems, it is similar to concepts such as reducing shortcuts or narrowing the gap with the target value and prefers the logical concept of “negative less” or “quantitative change” in Chinese meaning. For some time-dependent problems, “using time for space” is also a way of thinking to solve problems, so “maintain the same or do not change” can also be regarded as a solution option for transformation.

The above three transformation forms can be represented by three symbol concepts: the pronunciation of \(T[\sim 1, 0, \sim 1]\) is the transformation of “Negative one, Identical and Non-one.” The complaints with negative energy apply \(-1\) transformation to reduce the complaint value, and the maximum reduction is to return the negative value to zero. For example, after the function of \(-1\) on “troublesome” and “I do not know,” it can be transformed into “no trouble” and “known”; “no trouble” means that there is still some trouble, and “known” has zeroed the negative image of “I do not know” and transformed “problem” into “no problem.” If the \(-1\) transformation is conducted, then changing the original solution space or redefining the problem space can produce a qualitative change utility different from the original essence. For example: after the \(-1\) transformation of “too high price” and “must pass,” they can be “too high value” or “can pass,” referring that if the “value” is high, the “price” is not expensive; “can” pass means “not necessarily” must pass.

Technology comes from creativity [21], and ideology comes first to lead technology development as the core value and innovation key of the proposed method. Various solutions obtained through different transformation mechanisms fall in different conceptual space positions (see Figure 2). \(\sum C \cdot T[0]\) represents the result of transformation in identical formula, which is still the original complaint combination originally at the maximum negative value \(-X\) (use \(-X\) to represent the concept of negative number, and the value itself does not represent its distance or quantitative meaning); \(\sum C \cdot T[\sim 1]\) represents the result of all negative one transformation, which can approach the realm of “making the problem meaningless” or represent the 0 value of “no problem”; \(\sum C \cdot T[1]\) represents the result of all noneone transformation to achieve new content quality of “imagination.” Because “noncomplaint” is beyond the expected scope of “no problem,” it is called “wish” or “dream solution.”

The so-called “problems solved by self” is the result of the all noneone transformation of negative complaints. Dream solution can be defined as “a set of desire combinations with logical order formula (3).” Mastering the conceptual space location of the solution is helpful for the subordinates of follow-up key work such as product service system design, patent technology layout and market strategic planning.

\[
W = \sum C \cdot T[\sim 1].
\]

The problem solver can freely choose any transformation mechanism \((T[\sim 1/0/\sim 1])\) to transform for any complaint component constituting the overall problem, generate a variety of solution forms, and fall in different conceptual space positions. After confirming the conceptual spatial position of the transformation of all identical formula \((T[0])\), all negative one \((T[\sim 1])\), all noneone \((T[1])\), the \((T[\sim 1])\) transformation using mixed \((T[0])\) and \((T[\sim 1])\) mechanisms will fall into the conceptual space between \((T[0])\) and \((T[\sim 1])\), belonging to the predictable range of inertial thinking concept space, so it can also be called as progressive innovation concept space; the transformation result of \((T[\sim 1/\sim 1])\) will fall into the open concept space between \((T[0])\) and \((T[\sim 1])\). Because it is different from the inertial thinking concept space exceeding the existing expectation and imagination range, it can be called radical innovation concept space as a multidimensional concept space, which is presented in plane form for the convenience of discussion. The transformation result of \((T[0/\sim 1])\) will be between \((T[0])\) and \((T[\sim 1])\), scattered in the concept space of progressive and radical innovation.

4. Case Operation Demonstration

Creative ideas can express the content structure and logical ideas through Chinese forms. Different Chinese structures represent different logical thinking [22], where Chinese context and Chinese logic are used as operation tools to demonstrate case operation. The proposed use of solving problem with problem mode requires a high language ability of the operator with clear semantics, accurate, and good text logic [23], so that the text can be controlled like numbers and reduce the fuzzy space in logic as much as possible.

Taking the measurement of breast shape of developing girls as an example to illustrate the operation of the proposed model. The relevant literature of nearly half a century points out that 80%–85% of girls choose inappropriate underwear [24], and girls’ parents and bra shopping guides also lack correct shopping knowledge [25]. Through actual interviews and current situation of girls’ underwear patents and commodities analysis, it is found that between the unprotected vest circumference and adult bra, it not only lacks needed products for girls’ protection and company during their growth but also lacks measurement technologies and methods and tools for appropriate selection of products [26]. Bra products are one of the few blue oceans in the garment industry, and anthropometric problems have not been effectively solved for many years.

The basic reference framework for measuring experience process should be established first to give a new
measurement technology and method and use the thinking technology of problem-solving. Based on the standard process or experience connotation of general girl’s chest measurement, the general description of the existing measurement system providing measurement services is established from a neutral and objective standpoint, and the 10 procedure steps. Figure 3 shows the results of various transformations based on the standard procedure of chest measurement. Under the chest measurement, standard procedure are obtained. In the eyes of general customers, the obtained content is only a commonly used measurement service with a neutral attitude [27].

The first step in implementing thinking technique of letting problems solved by self is to define problem connotation $P = \Sigma C$. Those with previous unpleasant chest measurement experience or picky people with high negative energy as representatives are invited for focus discussion and questionnaire filling. According to their dissatisfaction experience or ask to adopt the attitude of criticism for progress, the reference content provided is redescribed and ask the subjects to express their dissatisfaction with each procedure step with the Likert Scale five subscale ($-5$ extreme dissatisfaction, $-4$ very dissatisfaction, $-3$ dissatisfaction, $-2$ some dissatisfaction, $-1$ slight dissatisfaction, $0$ no dissatisfaction). Through interview survey and questionnaire statistics, the contents and extent of various dissatisfaction opinions of representative users on the current chest measurement service system can be analyzed to obtain the complaint combination content under the negative complaint statement (see Figure 4) ($\Sigma Ci, i = 1 \sim 10$), including qualitative description and quantitative indexes (represented by C-shaped character fold line).

The second step of thinking technique of letting problems solved by self is to implement transformation $\Sigma C \cdot T = \Sigma E$. Taking negative complaint statement ($\Sigma C$) as operation object of transformation successively performs all $-1$ transformation and all $-1$ transformation to obtain no problem solution and dream solution and makes story according to statements as an auxiliary tool for subsequent measurement of dissatisfaction and expectation.

First, the significance of all $-1$ transformation is applied to establish an intermediary 0-value benchmark representing no dissatisfaction or meet expectations as a reference for subsequent comparison. After all $-1$ transformation ($\Sigma C \cdot T[-1]$), then qualitative statement of the zero-value baseline can be achieved, referring 10 step content that girls with perceived discomfort, identifiable degree of change, which focuses on the substantive procedures for customers to accept the service of chest measurement system and can be regarded as improvement design concept based on dissatisfied customer experience. Through a measurement method similar to the negative complaint statement, subjects about their dissatisfaction with the qualitative statement of the 0-value baseline are asked to obtain the 0-value baseline shown by the N-shaped character fold line as a reference line to divide problem and no problem.

After confirming the 0-value baseline, the effectiveness of conversion should be examined. The distance from each $Ci$ point to its corresponding $Ni$ point or the sum of the differences between them ($\Sigma (Ni-Ci)$) represents the expectation gap for subjects dissatisfied with current situation for improvement. Theoretically, the quantitative indexes of each step should show dissatisfaction value lower than the expectation ($Ci \leq Ni$); When dissatisfaction value is greater than or equal to the expectation ($Ci \geq Ni$), or $Ci \leq Ni$ with small difference, it can be considered that this step belongs to the conversion with limited efficiency, excluding the utilization of identical formula transformation, and belonging to the negative formula transformation process.

However, all $-1$ transformation is conducted to achieve optimal ideal solution or so-called dream solution ($W = \Sigma C \cdot T[-1]$). The Likert scale five subscale is also applied in (0 wait-and-see, +1 small expectation, +2 some expectation, +3 very expectation, +4 full expectation, +5 beyond expectation) with positive expectation measured to invite the subjects to focus on the content of each procedure step in the storyboard to provide their expectation of innovative chest measurement service model. Through interview survey and questionnaire statistics, the expected combination content of dream solution (see Figure 5) is obtained ($\Sigma Wi, i = 1 \sim 10$), represented by W character fold line; after reviewing the conversion efficiency, the W character fold line is confirmed. Theoretically, the distance from each $Ni$ point to its corresponding $Wi$ point or the sum of the differences between them $\Sigma (Wi-Ni)$ represents the subject’s expectation of dream solution. The greater the value, the higher the desire. Although the dissatisfaction degree of C–N line is not directly related or additive to the expectation degree of N–W line, the gap can be regarded as the worst to the best measurement experience gap. The wider the distance, the richer the conceptual differences that can occur.

After confirming the feasibility of turning resentment into wish mode operation, the technical feasibility of whether the dream solution can be realized is analyzed.
| User Journey | Procedure                          | Negative Complaint (C)                         | All Negative One (N)      | All Non-one (W)       |
|-------------|-----------------------------------|-----------------------------------------------|---------------------------|----------------------|
| 1           | Girls with breast development     | Girls with constant change of chest           | Girls perceiving discomfort | Girls expecting change |
| 2           | Confirm chest size                | Difficult to confirm change degree            | Identifiable change degree | Predictable change trend |
| 3           | Take off clothes                  | Chest touch with embarrassment               | Self-touch chest to measure | Non-touch chest measurement |
| 4           | Measurement with the assistance   | Others’ strong subjective experience         | Strong personal subjective experience | Objective scientific judgment |
| 5           | According to characteristic points| Not rigorous measurement point               | Basis for measurement point | Measure coordinate system |
| 6           | Measure size with tools           | Inaccurate measurement technology            | Accurate measurement technology | Systematic measurement technology |
| 7           | Convert size to size              | Large conversion mode error                  | Small transformation mode error | Accurate conversion mode |
| 8           | Recommend products to buy         | No embodiment of symmetry degree             | Embodiment of symmetry degree | Direct estimation of compensation |
| 9           | Try it on to make fit             | Difficult to check abnormal posture          | Check abnormal body posture | Inferred abnormal posture |
| 10          | Measure next time                 | No accumulated data changes                  | Accumulated data changes   | Accumulated personal data |
| Service Quality | General measurement service     | Inaccurate measurement services              | Low error measurement services | High accuracy measurement services |
| Element Value | Reference schema(0)              | Disappointments and complaints(-X)           | Meet expectations(0)       | Honor dream(+X)       |

**Figure 3**: Results of various transformations based on the standard procedure of chest measurement.

| Procedure                          | Negative Complaint (C)                          | All Negative One (N)      | All Non-one (W)       |
|-----------------------------------|-------------------------------------------------|---------------------------|----------------------|
| Girls with breast development     | Girls with constant change of chest             | Girls perceiving discomfort | Girls expecting change |
| Confirm chest size                | Difficult to confirm change degree              | Identifiable change degree | Predictable change trend |
| Take off clothes                  | Chest touch with embarrassment                  | Self-touch chest to measure | Non-touch chest measurement |
| Measurement with the assistance   | Others’ strong subjective experience            | Strong personal subjective experience | Objective scientific judgment |
| According to characteristic points| Not rigorous measurement point                  | Basis for measurement point | Measure coordinate system |
| Measure size with tools           | Inaccurate measurement technology               | Accurate measurement technology | Systematic measurement technology |
| Convert size to size              | Large conversion mode error                     | Small transformation mode error | Accurate conversion mode |
| Recommend products to buy         | No embodiment of symmetry degree                | Embodiment of symmetry degree | Direct estimation of compensation |
| Try it on to make fit             | Difficult to check abnormal posture             | Check abnormal body posture | Inferred abnormal posture |
| Measure next time                 | No accumulated data changes                     | Accumulated data changes   | Accumulated personal data |

**Figure 4**: Basic reference architecture, negative complaint statement, and intermediary 0 value benchmark.

according to the existing technology or available resources of the operator or his organization, so as to establish a list of required technologies and industrial resources such as relevant technology, R&D, main functional characteristic test, prototype production, and product development [28]. Based on the analysis of the available industrial technology and resources in today’s society, the dream is a feasible idea. For the convenience of discussion, the core value of dream solution—FEEL Tech System (FTS)—qualitative statement is taken as the framework to explain technical requirements and feasibility analysis (see Figure 6).

According to the innovative design highlights of FTS structure, it can be judged that the supporting products and service systems required to provide innovative services can be divided into two parts: one is the available technical resources of the affiliated enterprise, and the other is the additional required technologies and resources difficult to access with need to be created or developed.

The available technical resources required for dream solution practice is the mature and directly or indirectly accessible technologies and resources, and the development of additional required technology and resources has a good technical foundation with limited threshold height to produce patented technology and social and industrial benefits derived from its operation mode [29], promoting healthy development of regional economy and shaping social image of convenient travel, and the proposed dream solution is not far from the concrete realization.

In addition to the no problem solution of all -1 transformation and the dream solution of all -1 transformation, the model of turning resentment into wish more systematically provides all possible solutions from negative
complaint solution to no problem solution and dream solution. Because each content step can produce at least three combined solutions through the transformation of the negative one, identical formula and nonone \((T[0/−1/−1])\). Relatively speaking, \(-1\) transformation tends to closed directional transformation, and there is a single or a few solutions to reduce or eliminate the content of negative complaints; \(-1\) transformation is an open nondirectional transformation with lateral qualitative adjustment, which can transform the same negative complaint content into multiple groups of heterogeneous solutions.

Theoretically, measuring the experience process by the chest shape of \(N\) negative complaints can produce at least \(3^N\) groups of solutions with conservative estimation. If the calculation of the first and last measurement experience steps that are relatively less transformative are excluded, at least \(3^{N-2}\) solutions can be obtained, including at least \(2^{N-2}\) radical innovation ideas. Only a small number of nonone transformation effects can produce radical innovative ideas, such as \((N1, C2, W3, C4, N5, W6, N7, C8, N9, N10) = \text{(due to growth)} \text{ girls who feel uncomfortable (bra) (N1), it is difficult to confirm the breast shape change degree (C2), (but because of shyness, they hope) non-touch measurement (W3), (coupled with strong subjective experience of others (C4) in the measurement process), (to ensure scientific) the measurement base point (more) should be based on (N5), the measurement technology (provided to you) should be systematic (W6), (and) the transformation mode error is small (N7), (perhaps because it is in the early stage of development, the breast) symmetry (temporarily) does not appear (C8), (but) the posture (whether) is abnormal (N9), data changes (lifetime of chest posture) can be accumulated (N10).}

5. Innovation Characteristics Analysis

Based on the three elements of patent examination (novelty, progress and industrial utilization), this paper analyzes the main innovative characteristics of problems solved by self-thinking technology.
In novelty, the above demonstration operation cases propose that the proposed model is an innovative design model using Chinese logic to operate mathematical problem-solving strategies, adopting strategic thinking of problem-cooperation, using problems, transforming thinking framework, generating solutions beyond expectations, and systematically and automatically generating many solutions. Although there may be incremental solutions or virtual solutions with relatively low industrial value, or ideal solutions that may not be accessible by existing technologies, it completely points out all the solutions for development, and each solution specifically represents the connotation of user experience connected with the market, which is a specific practice of consumer-oriented design technology and method concept and a systematic creative project to provide a complete solution. The creative spectrum formed by all solutions can also be used as a "guide map for technological innovation and development" [30], as a thinking tool with aesthetic, engineering and business significance, academic research value, and industrial application potential.

For progress, the relative advantages of the proposed model can be clearly distinguished by comparison with relevant creative technology methods. For efficacy, the proposed model can explore issues such as experience innovation or emotional design difficult to be involved in TRIZ method. Although the brain concussion method often used in design thinking can diffuse thinking and produce a large number of creative ideas, it is easy to vary from person to person or encounter inspiration with the unstable quality of creative process and output [31]. Morphological analysis, called pattern matrix method, is a creative thinking technique systematically analyzes the elements of product form and structure, deconstructs the characteristics, and then recombines them [32]. It is similar to the proposed model in the process technology of "structure, deconstruction and reconstruction" and in the combination form of mass production creative ideas. However, the type analysis method mostly takes the spatial type and structural elements as the creative derivation framework through comparative analysis with competitive products or similar products. The significance in the creativity quantity production is much greater than or higher than the improvement in the creativity quality. The creative content is mostly incremental rather than radical innovation, and it does not involve the strategic thinking of cooperation with problems and the cognitive feeling and experience connotation of product service system.

Compared with another Mandala Chart, winning by quantity, it takes a group of participants to fill up the complete four rounds with a total of 585 (=8^5, n = 0~3) to produce 4680 (=8^8, n = 1~4) creative components to explore the way to solve the problem [33]. Creative components only produce the constituent components of the idea, not enough to become an idea with conceptual components. Compared with the creative concept productivity of the proposed model above, the negative complaint program composed of eight experience contents only needs one or a few people to operate, which can easily produce the number of 6561 (=3^7) concepts in a short time, beyond the sum of the four rounds of datura thinking. Moreover, each concept has its own logical order, representing a relatively complete measurement experience content and converting the customer measurement experience expectation value, with the concept content statement of "quality, quantity." According to current literature analysis, the creative capacity of the proposed model is comparable to that of any existing creative thinking technology or design method using manpower, except that information technology can surpass in quantity in certain fields through artificial intelligence and big data algorithms. However, the proposal of this model provides a new technical framework and theoretical basis for digital creative computing or the so-called robot creative ability.

In terms of practicability, the thinking technique of letting problems solved by self can be applied to life or industry, and the innovative ideas produced by it have the possibility of being put into practice. The industrial significance of developing new products or service systems is nothing more than production, attack, defense, and cooperation. Production refers to the creation of intellectual property and subsequent industrial application. Attack and defense can be divided into two aspects to capture new market opportunities or greater market share, and prevent competitors from entering or following to protect their own niche. The basis of cooperation is that the resources of both parties (or multiple parties) need to complement each other, and intellectual property is the core technical resources. The proposed model can make specific contributions to the above three aspects.

The thinking technique of letting problems solved by self can produce huge "solutions" under the condition of saving the most manpower, which is far more than the number of "solution" that can be produced by simply relying on team manpower to carry out brainstorming or other creative technologies. As far as the degree of creativity is concerned, "conception" is only a preliminary "solution." Because of the large number of solutions, it is necessary to use an efficient solution quality evaluation and screening mechanism, conductive to point rout solutions with value or potential. In terms of attack, defense, and cooperation, the quality of solutions produced is both progressive and radical. Each solution pays attention to the customer experience process or innovative service process, takes the guiding significance of operation and consumer demand into account, and is systematically scattered on the innovation concept space, regarded as a "technological innovation development guide," so as to master competitors, partners, and strategic layout as a reference for the study and judgment of attack, defense, and cooperation. For business strategy, we can examine all ideal solutions; difficult to realize by our own resources, protect, and utilize patent potential; generate intellectual property rights and turn them into technical commodities or asset leverage for cooperation; authorize others to implement or set up patent mines to become offensive and defensive weapons; or an incentive to attract the alliance of partners.
6. Conclusion

Based on the structure of thinking dilemma composition, this study develops three types of nine strategic approaches, producing solutions, points out the innovative thinking of problems solved by self, summarizing eight operational essentials from the strategic thinking of solving mathematical problems, and putting forward thinking technologies that can break through the thinking framework.

Problems solved by self is an innovative thinking technology using word logic to operate mathematical strategies. The problem-solving framework from the existing problem materials is inferred, replace numbers with words, and use rational logical thinking to guide the development of perceptual concepts, and systematically and automatically generate many solutions. Each solution concept has its logical order, representing a relatively complete set of user experience content, and has both qualitative and quantitative concept statements.

Through the application of demonstration cases and comparative analysis with the effectiveness of relevant creative technology methods, the feasibility, novelty, progress, and practicability of the proposed model are verified to help model users think outside the existing framework, expand their thinking space, create “unknown needs” of consumer users, and make design as “a purposeful creative behavior,” with more stability and predictability, which are the important basis of science. The proposed thinking technology and problem-solving mode takes the thinking mode of natural science and social science into account and takes the essence of innovation (seeking innovation and change) and human nature standard (perceptual rationality) as the development characteristics, so as to help to shape the systematic view and discipline paradigm of design as a science (design science).

Since the content and quality of the solution of the output will be greatly affected by the language tools of the mode operation, it focuses on Chinese language logic and context as the development and test vehicle currently. In order to expand the effectiveness and international influence of the proposed mode, the research focus in the next stage will be on the research and development of English language logic and context as the operation tools to compare the characteristics of Chinese and English tools and the main differences between them in process and output efficiency. In addition, the utility comparison of different attribute cases and the quantitative analysis involving weight calculation and complex screening mechanism will be studied in future.

Data Availability

The dataset can be obtained from the corresponding author upon request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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