

Determining Qualitative Parameters Using TRIZ for Estimating IP Value of Intangibles

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Abstract

One of the primary issues faced by the knowledge economy is the valuation of intellectual assets. Intellectual assets are generally categorized into, Intellectual property (Patents, Trademarks, and Copyrights etc.), explicit knowledge (specific business related processes, methodologies and procedures etc.), and human resources. Value may be defined as the worth or the economic benefit that accrues for the intellectual assets to the owner over a time period. Valuation of any of these intangible asset is essential for financial reporting, M&A, commercialization, securitization, sale, calculating damages on IP infringement etc. However, valuation of each of these intellectual assets and most typically, valuation of technology assets/patents poses a problem unique to it and can be complex in nature depending on the situation. Further, the absence of organized trading in intangibles has been a major hindrance to their recognition as actual intangible assets in financial reports. Currently, there are a number of methods commercially available for valuation of patents or technology. However, these methods do not take into account the intrinsic value or technological merit of any technology asset or patents and therefore, companies usually prefer to adopt conventional techniques financial methods of valuation, which we believe is incomplete and does not reflect the real value of technological intangible assets. Hence, it is essential for companies to consolidate the IP value of an intangible asset along with the financial value to derive the actual value of the asset. In this paper, the authors use the TRIZ methodology to derive the factors and parameters that influence the IP value of a technological asset and more particularly, a patent and then use this factor along with the financial value to determine the actual projected value of an intangible asset.

Introduction:

This paper address assessing one or more parameters used generally for valuating an Intellectual property, in particular patents. The assessment of parameters is essential to determine whether those parameters which are being used to determine the value of the patents is essentially the correct ones are not. For assessing the value of the patent the authors of this paper have used concept from TRIZ.

There are one or more approaches suggested in TRIZ that can be considered for valuation of patents. The commonly used approaches from the TRIZ to determine the value of the patent includes 1) contradiction and principle analysis 2) trend analysis, 3) function and resource analysis and etc. This paper uses the contradiction and principle analysis approaches to access the parameters considered for valuation of patents.

Patent valuation parameters:

The parameters that are being used in general for valuation of patents can be broadly classified as quantitative parameters and qualitative parameters.

Few of the quantitative parameters can include 1) family size analysis, 2) forward citation analysis, 3) backward citation analysis 4) maintenance analysis and etc.

Similarly few of the qualitative parameters can include 1) claim scope analysis 2) novelty analysis 3) crowd analysis 4) sustainability in opposition analysis 5) enforceability analysis 6) litigation analysis 7) validity analysis 8) technology advancement analysis 9) ownership analysis and etc.

The quantitative parameter basically revolves around the numbers and may be essentially to determine the value of the patent. Few of the quantitative parameter may be an integral part of the qualitative parameters for assessing value of the patents. This paper addresses assessing only the qualitative parameters that are used in determining value of the patents.

Details of the quantitative parameters: For determining value of a patent based on the claim scope analysis the user has to check the broadness or narrowness of claims. The novelty of the patent may be ranked taking the number of close or relevant prior art patents for the patent invention.

The crowd analysis can consider a) no. of inventors/ assignees working in the area b) scope of the applicable domain c) IPC/ USC based crowd d) cluster patents – CIP, continuous & divisional and etc. e) chain of citations.

The sustainability in opposition analysis considers a) possible opposition – i.e. by competitors, inventors, Government, NGOs and may be nature of invention.

The enforceability analysis considers a) patent maintenance b) jurisdictions / family of the patents.

The validity analysis can consider a) hidden prior arts or publications b) traditional knowledge c) nature of the invention d) relevant prior arts e) patent citations and etc.

The technology advancement analysis considers the stage of the invention i.e. whether the invention is a breakthrough technology, one of a kind or improvement to the existing art (also the level of improvement).

The ownership analysis can be based on whether the patent being rewarded to individual, assignee, joint ownership, collaboration and etc.

About TRIZ approach for valuation:

This paper discusses and uses the contradiction and principle approach of TRIZ to assess the quantitative parameters of valuation.

The contradiction and invention principles used to assess the value of patent are referenced from chapter 11 – problem solving tools (conflict elimination/ invention principles) of Hands on systematic innovation for business and management – Darrell Mann. The parameters discussed in conflict elimination chapter are 31 X 31 parameters for business and management, wherein the principles are the standard 40 principles as provided by Genrich Altshuller.

These 31 X 31 parameters are

- 1) R&D spec/ capabilities/ means
- 2) R&D cost
- 3) R&D time
- 4) R&D risk
- 5) R&D interfaces
- 6) Production spec/ capabilities/ means
- 7) Production cost

- 8) Production time
- 9) Production risk
- 10) Production interfaces
- 11) Supply spec/ capabilities/ means
- 12) Supply cost
- 13) Supply time
- 14) Supply risk
- 15) Supply interfaces
- 16) Support spec/ capabilities/ means
- 17) Support cost
- 18) Support time
- 19) Support risk
- 20) Support interfaces
- 21) Customer revenue/ demand/
feedback
- 22) Amount of information
- 23) Communication flow
- 24) Harmful factors affecting system
- 25) System generated harmful factors
- 26) Convenience
- 27) Adaptability/ versatility
- 28) System complexity
- 29) Control complexity
- 30) Tension/ stress
- 31) Stability

These parameters are built specifically for addressing conflicting parameters associated with the business and management industry. The 40 standard principles can be referenced in TRIZ journal. However the interpretation for all 40 standard principles was standardized keeping business and management vertical.

Objective & Problem statement:

Improving parameter:

It is being observed that the objective for any individual trying to determine value for the patent is to arrive at an optimal valuation. The word optimal here refers to creating a Win-Win situation for all stakeholders involved in valuation i.e. patent holder, licensee, end customer, and etc.)

The generic improving parameter is “Optimal valuation” which can be mapped to parameter no. 21 i.e. customer revenue/ demand/ feedback & parameter no. 6 i.e.

production specification/ capabilities and means.

The parameter 21 suggests deriving optimal value with a win-win situation. The generic improving parameter “optimal valuation” is thus mapped to specific improving parameter “customer revenue/ demand/ feedback”.

Similarly, the parameter 6 suggests developing system for valuation. The generic improving parameter “optimal valuation” is thus mapped to specific improving parameter “production specification/ capabilities and means”.

Worsening parameter:

The most common conflicting factor for generating the optimal value is being identified as a) assumptions are high b) future forecasting & c) essential attributes of the IP valuation to be considered.

All these generic worsening parameters can be mapped to one or more specific parameters available in TRIZ. The generic worsening parameter “assumptions are high” results in risk to the valuation of the patent, which may be mapped to parameter 9 i.e. production risk

Similarly, the “future forecasting” may lead to errors in valuation of the patent, which may be mapped to parameter no 24 i.e. harmful factors affecting system. Finally, the “essential attributes of the IP valuation to be considered” can be a complex process which may be mapped to parameter no 28 i.e. system complexity.

The parameter 9 suggests risk associated with the process or manufacture environment. The generic worsening parameter “assumptions are high” is thus mapped to specific worsening parameter “production risk”.

Similarly, the parameter 24 suggests adversity in the system, which may be

correlated to the valuation adversity. The generic worsening parameter “future forecasting” is thus mapped to specific worsening parameter “harmful factors affecting system”.

Finally, the parameter 28 complexity associated with the system and process. The generic worsening parameter “essential attributes of the IP valuation to be considered” is thus mapped to specific worsening parameter “system complexity”.

In total 6 contradictions are being identified with regard to valuation of patents. The specific improving parameters are a) customer revenue/ demand/ feedback & b) production specification/ capabilities and means. The specific worsening parameters are a) production risk, b) harmful factors affecting system (valuation adversity) & c) system complexity.

Contradiction matrix

S. No.	Contradiction parameters (Improving parameter X worsening parameter)	Corresponding principles
1	21 X 9	13, 22, 7, 24, 39
2	21 X 24	39, 3, 5, 17, 26, 35
3	21 X 28	25, 1, 2, 19, 10, 4
4	6 X 9	6, 27, 35, 22, 12, 37
5	6 X 24	22, 24, 35, 13, 2
6	6 X 28	12, 17, 27, 26, 28, 24, 13

First slot:

The most commonly used principles i.e. specific solution are 22, 13, 24, 35 - 3 times across the contradiction matrix for all 6 specific problems (contradiction).

Second slot:

Similarly, the next most used principles i.e. specific solution are 17, 1, 2, 39, 26, 27, 12 – 2 times across the contradiction matrix for all 6 specific problems (contradiction).

Third slot:

The rest of the principles 7, 3, 5, 19, 10, 4, 6, 25, 37 & 28 – 1 time across the contradiction matrix for all 6 specific problems (contradiction).

Fourth slot:

There are few principles which are not part of this contradiction matrix, but may be used for assessing the parameters of the valuation. Those parameters include 11, 36, 23, 38, 29, 21 & 32.

The definition & explanations about all principles (referenced above) are being cited in TRIZ journal.

Inventive Principles:

Inventive principles in TRIZ refer to the generic solution used across industry. Referring to first slot of principles which have being referenced for 3 times in the conflicting parameters (listed above), the following observation may be derived.

The inventive principle 22 refers to “Blessing in disguise” or “Turn lemons into lemonade”. This principle refers to using harmful factors to achieve a positive effect. This generic principle may be correlated to a method in which a patent is granted i.e. determining whether the patent is being granted in a normal prosecution procedure or has it being undergone “request for continuous examination” (RCE) – specific solution (1). The harmful factor may be denial of patent and positive factor may be applying for RCE for keeping the patent in prosecution stage for obtaining patent. One could assign patent appropriate weight-age and scores to determine the value of the patent, based on the method or route employed by the patent owner for obtaining the patent.

The inventive principle 13 refers to “The other way around”. This principle refers to inverting the actions used to solve a problem. The problem associated with future forecasting could be solved using the past

valuation data of the patent for future forecasting and also can consider backward citation patents for future forecasting – specific solution (2). The inversion action here may refer to referring back to the previous reliable data to derive optimal value.

Also, the method in which the patent is being subject to prosecution i.e. whether a normal track is being employed or the fast track i.e. fast examination procedure. This may also be considered as inverting the normal action to achieve the solution.

The inventive principle 24 refers to “intermediary”. This principle refers to using intermediary carrier article or process to solve the problem. The market analysis (non patent analysis) or the competitor analysis can be considered as an intermediary action performed by the valuator before valuating the patent – specific solution (3). The intermediary action here can be referred to performing analysis around the valuating patent before valuation.

The inventive principle 35 refers to “parameter changes”. This principle refers to changing the concentration or consistency. The generic principle may be correlated to determining the change in consistency/ concentration of inventor for a particular patent or patent cluster within the same technology – specific solution (4). The more concentrated inventors with good patents in the cluster may be used as a judgmental factor for valuating patent. The cluster of patents may be obtained by conducting a landscape analysis for the related technology. The consistency change principle may be correlated to change in inventor or assignee.

Referring to second slot of principles which have being referenced for 2 times in the conflicting parameters (listed above), the following observation may be derived.

The inventive principle 17 refers to “another dimension”. This principle suggests using

making use of unused dimensions. The generic principle may be correlated to determining whether the patent that is considered for valuation can be opposed by other assignee, inventors, NGO, Govt or etc. – specific solution (5) i.e. is there a way the patent be invoked in future? Or is this good patent to sustain such risk. Another dimension for possible opposition of the patent can be a factor which may be used for valuation.

The inventive principle 1 refers to “segmentation”. This principle refers to dividing the system or object into independent parts. The independent claims are segregated/ separated into one or more elements for enabling or depicting the novelty of the invention – Specific solution (6). Thus, for determining the value of the patent, one could check how much element does the main or independent claim has and based on that an appropriate score can be given to determine the value of the patent.

The inventive principle 2 refers to “taking out”. This principle refers to single out the only necessary part. The claims of the patent which is considered for valuation can be verified for depiction of essential number of elements in the independent claim – specific solution (7). Singling out the essential elements (with limited elements) may increase the value of the patent.

The inventive principle 39 refers to “calm atmosphere”. This principle teaches replacing normal environment with inert ones. Thought can be given for mapping this principle to any of the quantitative parameters used for valuation of patents. Similarly, inventive principle 26 refers to “copying”, 27 refer to “cheap disposable” and 12 refer to “remove tension”. All these principles can be considered for mapping to one or more quantitative parameters used for valuation.

Referring to third slot of principles which have being referenced for 1 time in the

conflicting parameters (listed above), the following observation may be derived.

The inventive principle 7 refers to “Nested Doll”. This principle teaches passing things through one another. The patent to be valued need to be checked for the level of citation it has gone through i.e. level of citation (1st level or 2nd level or etc.) – Specific solution (8). By assigning score and weight-age, for each level of the citation, an appropriate value could be derived.

The inventive principle 3 refers to “local quality”. This principle teaches system or process to function in conditions most favorable or suitable for its operation. The patent comprising UPSC or IPC can be used as instrument to determine the value of the patent – specific solution (9). The UPSC or IPC can determine the scope and applicability of the patent in various technological buckets assisting in deriving value to the patent.

The inventive principle 5 refers to “merging”. This principle teaches bringing closer or identical things to perform parallel functions. The patent to be valued can be checked for any possible obvious rejection. The obvious rejection may happen based on two or more patents/ non patent literature depicting the novelty – specific solution (10). The pair of the patent with such rejections may be provided appropriate scores and values to calculate the value. Additionally, the patent is being considered for CIP/ continuous and divisional patent – specific solution (10) may help in determining proper value to the patent.

The inventive principle 19 refers to “periodic action”. This principle teaches changing the frequency of the periodic action. The patented solution to be valued may be assessed for payment of maintenance fee, solution being considered FTP, audit and other IP related stuff to determine the value – specific solution (11). The frequency of this may help in assisting determining the value of the patent.

The inventive principle 10 refers to “prior action”. This principle teaches prearranging stuff, so that it becomes handy without waste of time. The patent to be valued can be checked for jurisdiction considered for filing i.e. single country or multiple country or WIPO route and etc – specific solution (12). This enables to determine better value to the patent.

Additionally, if the patent is being considered for continuous patent or divisional patent filing etc – specific solution (12) then some pre action is being applied to cover the technology domain.

The inventive principle 4 refers to “asymmetry”. This principle teaches changing object from symmetrical to asymmetrical. The assignee of the patent can be checked to determine the asymmetry i.e. is it being filed in collaboration environment or solely – specific solution (13). This collaboration factor may helpful in determining value of the patent.

The inventive parameter 6 refers to “universality”. This parameter teaches eliminating the need for other parts. The patent to be assessed can be checked for its generic claims, the more the generic claims it would be cover more domains – specific solution (14). The more generic the claim is the more the value of the patent.

The other inventive principles 25 refer to “self-service”, 37 refer to “relative change”, 28 refer to “another sense”. All these principles can be considered for mapping to one or more quantitative parameters used for valuation.

Referring to fourth slot of principles which have being not being referenced in the conflicting parameters (listed above), the following observation may be derived.

The inventive principle 29 refers to “fluidity”. This principle teaches viewing competitors as collaborators in certain projects and ventures. The patent considered for valuation may be checked

whether it's being assigned to individual or companies or are in collaboration to determine the value – specific solution (15). The score may increase or decrease depending on type of the assignment.

The inventive principle 11 refers to “prior cushioning”. This principle teaches preparing emergency means beforehand. The patent which is being valued can be checked for filing route – specific solution (16). If it is being filed using PCT it may be considered to have more value.

The inventive principle 36 refers to “paradigm shift”. This principle teaches determining the shift in the economy. The forward citation of the patent to be valued can be checked for determine the phased technology or absolute technology – specific solution (17). The patent with less forward citation may be in non man's land.

The inventive principle 23 refers to “feedback”. This principle teaches changing magnitude or influence on the feedback. The prosecution history of the patent can be checked when enforcement happens to obtain the feedback on that patent – specific solution (18). The prosecution history estoppels may be helpful in determining the value of the patent.

The inventive principle 38 refers to “enriched atmosphere”. This principle teaches expose highly enriched atmosphere. The relevant prior art and forward citation of the patent to be valued can be used to determine the technology progress and similar technology to assess the value of the patent – specific solution (19). The more the forward citation and less the crowd may have incremental value on the patent.

The inventive principle 21 refers to “hurrying”. This principle teaches conducting certain process at higher speed. The patent being filed using faster examination process can have more potential value in the market – specific solution (20). The patent with normal route

to examination may have comparatively lesser value.

The inventive principle 32 refers to “color changes”. This principle teaches using smoke screen to disguise confidential info. The patent considered for valuation may be checked for smoke screen builder around that patent – specific solution (21). The patent value may be increased if it's being identified as main patent and is surrounded by other patents.

Overall 21 inventive principles have a say on one or more quantitative parameters considered for assessing the value of the patent.

Analysis:

The quantitative parameters discussed earlier (Patent valuation parameters) are being referenced by at least 21 inventive principles.

The synopsis of these references includes

- 1) Claim scope analysis – Principle no. 1, 2
- 2) Novelty analysis – Principle no. 2
- 3) Crowd analysis – Principle no. 21, 3, 6, 32, 5, 10, 24, 35 & 13
- 4) Sustainability in opposition analysis – Principle no. 4, 17
- 5) Enforceability analysis – Principle no. 19, 19 & 23
- 6) Litigation analysis – Principle no. 36
- 7) Validity analysis – Principle no. 5, 11 & 38
- 8) Technology advancement analysis – Principle no. none
- 9) Ownership analysis – Principle no.29

It is being observed from the above list that all quantitative parameters considered are backed up the inventive concept of TRIZ.

Among those, the crowd analysis parameters are the most commonly referenced. Wherein the technology advancement parameter does not get any backup from the TRIZ methodology.

The rest of the parameters i.e. sustainability in opposition & litigation parameter may also have a say in the quantitative assessment of the patent value.

Conclusion:

The crowd analysis parameters are the most backed up parameter. Technically claim scope, novelty, crowd, enforceability & validity parameters are the preferred parameters for assessing value of the patent.

Future action:

The future paper on TRIZ related to valuation may include on 1) assessment of quantitative parameters for determine value of a patent using trend analysis and/ or function and resource analysis. 2) Assessing value of the Intellectual property (IP) and product build using the patented technology.

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