The Fuzzy Front End of New Patent Development

Adam Bobek, Joseph Cho, John Elliot, Matt Nickeson

December 8th , 2011
ETM 543 Front End Management for New Product Development
Portland State University
Winter 2011

ETM OFFICE USE ONLY
Report No.:
Type:
Note:

Table of Contents

Abstract

This paper seeks to answer the question: "What tools and methods can help with IP evaluation and selection in the Fuzzy Front End (FFE)?" We have analyzed the modern literature and identified a multi-criteria weighted scoring model that can be used to help with the patent decision process. Further, we have identified the key factors to incorporate into this model and obtained weights from a survey sent it to IP professionals. The model was tested through the utilization of three case studies. The results of this evaluation demonstrate that our weighted scoring model can be used as a tool to assist with patent decisions in the Fuzzy Front End.

Introduction

On the 8th of March 2011, The US senate voted on a measure that overhauled U.S. patent laws. The transformation from "first-to-invent" to "first-to-file" has altered U.S. intellectual property (IP) strategies in dealing with wealth creation and protection for technological innovations. The US has been facing a struggle to keep up with patent applications and this reform is designed to help reduce the backlog of patent applications and streamline the patent process. Figure 1: US Patents, 1990-2010 [1] below shows the large backlog of patent applications that the US system is currently facing.

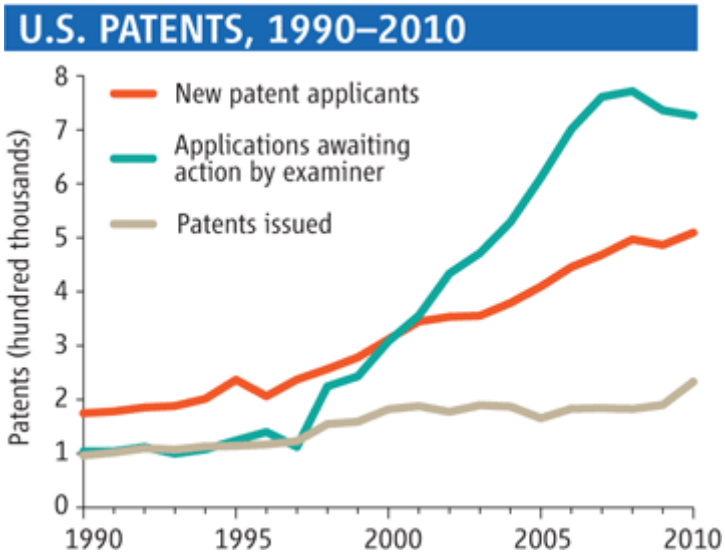


Figure 1: US Patents, 1990-2010 [1]

Historically, the US has held different patent laws from the rest of the world by following a "first-to-invent" system. The US laws stated that as long as a patent applicant could prove that they were the first to create an invention, then they could be granted the rights to a patent. These laws allowed companies to pick and choose their patents more freely. If they were unsure if an idea was worth patenting, they could hold on to it and see what happened with the market. If another company tried to patent their idea at a later date, they could come back with the proof that they were the first to invent and get the rights to the patent. It also protected individual inventors and small companies. [1] These individuals, without the financial ability to patent every invention, could still get the patent

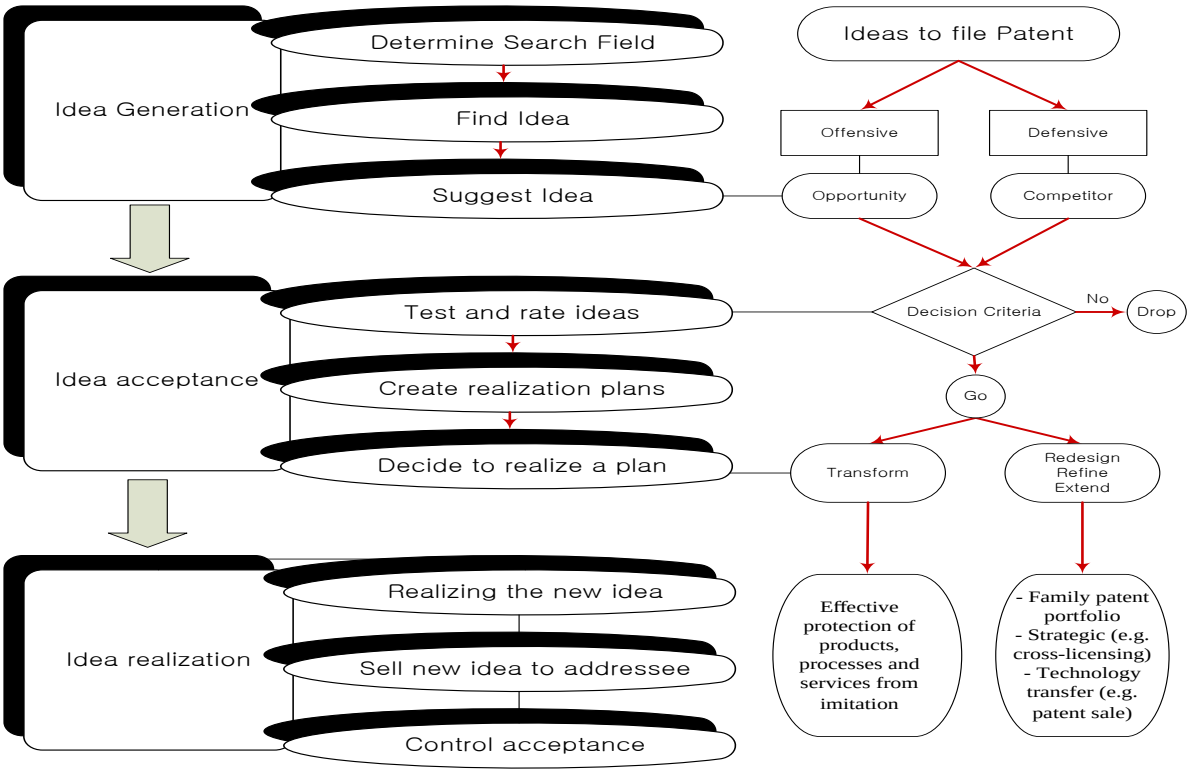
rights to an invention if they could prove that they were the first to invent the idea. The three key advantages of the first to invent system are as follows:

1. It is fairer to the inventor. The one who is first to invent gets the patent
2. It enables the inventors to perfect their patents before submitting
3. It prevents larger companies from gaining advantages through submitting first [2]

The drawback of the first to invent methodology is that it creates a very slow and cumbersome patent process. Lengthy court battles result from different companies attempting to prove that they were the first to invent an idea.

In the rest of the world, the first to file patent system is followed. In this system, the first party to file for a patent gets the rights to that patent. There are three main advantages to this approach:

1. Simplification of the administration involved
2. Decrease of disputes in law
3. Inventors are induced to submit their patent applications sooner



Adapted from sources: [3], [4], [5]

Figure 2. Idea Selection Process in Fuzzy Front End

Figure 2 shows how the idea selection process links with the decision making process of patent filing in the Fuzzy Front End. Given this new direction for the US patent system, companies have to adapt their strategy accordingly. The main objectives to file a patent are offensive as well as defensive. One reflects quality, and the other represents quantity. Patents also support strategic technology management. For the offensive purpose, effective patent protection of product, process and services from imitation have been identified as an important source in taking competitive advantage. On the other hand, for the defensive purpose, companies not only make a profit from patent licensing and patent sale but also take advantage of bargaining chips in competitive business domains. In the past, patent decisions could be made later in the development process, but now the decision must be made in first to file patent law system at the Fuzzy Front End. So they need some tools to make a right decision at the early stage. There are many tools available to companies for managing the Fuzzy Front End and for making effective decisions about products in the early stages of development. These tools are typically applied to product/technology selection, but this report will investigate how these models can be applied to patent selection.

Figure 3. Research Framework

Figure 3 presents the framework of the study. The first section of this paper completes an in-depth literature review of the various fuzzy front end methods that could potentially be applied to patent decisions. The methods are identified, compared, and critically reviewed

for effective application. Based on this analysis, a method is recommended for use as a patent selection tool. We also asked experts in IP about what methods can be considered in FFE. The second section of this paper identifies the key criteria to be considered in the patent selection process. An in-depth literature review as well as expert survey is used for this process. Once the criteria have been identified, we rank the criteria based on how important each one is for patent selection. The ranking of the criteria is based on data collected through a survey of patent attorneys and professionals. Finally, the criteria and weights are assembled into the method selected in the first section to propose a patent selection method. This method is tested through case studies of existing patents.

What methods exist for IP selection/evaluation?

In order for companies to maintain their competitive advantage they must be continually perusing the generation of "systems with attributes which correspond to the key buying criteria for the majority of the customers in their target market."[6] At the intersection of form, technology and customer needs/benefits lies these new products.[7] In order to bring them to fruition, a "basic process" composed of five phases is utilized: [7]

- Opportunity Identification and Selection
- Concept Generation
- Concept Project Evaluation
- Development
- Launch

Once an idea has been spawned from the ideation stage within the concept generation phase, pools of new product concepts are formed. Regardless of their creation, analytical problem solving, applying existing technology in new ways, surprise problem solving or others, all non-obvious solutions are possible patent opportunities. [7] But what methods exist for IP selection and evaluation to help an IP attorney choose which idea to patent? To answer this question an in depth literature review was conducted on papers which used decision models to ascertain the valuation of patents, and a survey was distributed to ascertain what they utilized. Our survey was issued to two local Patent attorney law firms "Narkowitz, Herbold, Glade & Mehlhaf" and "Marger Johnson & McCollom", and one general

Counsel at C&K Market, Inc. These recipients also indicated to us that they sent our survey to their "Attorney Network of Patent Lawyers". This later effort indicated that "Gut feel" was the dominate method selected when considering if an idea should be patented. This indication was driven off of 5 responses where 2 attorneys indicated "Gut Feel", and one indicated that "Real Options" were utilized. The other two declined to answer the question of "Have you used any of the following methods in selecting if you should/shouldn't patent an idea?" [Appendix C: Survey One].

Literature Review

Since the primary driving force for this work was based upon Joe Shallenburger's, Director, Corporate Intellectual Property & Chief Patent Counsel at Cascade Microtech, sense that perhaps methodologies from the Fuzzy front end may be applied to aid a Decision Maker(DM) in selecting an idea for pursuit of its patentability. We investigate within this section several financial and non-financial decision models from the Fuzzy front end for a comparative research study. We also located a work[8] that demonstrated the utilization of Analytical Hierarchy Process(AHP) as a means to valuate patents. AHP is a model within the multiple criteria decision-making models (MCDM); as such we investigated other models in this research realm for our comparative study. Our guiding principle of evaluation for the validity was driven off of three main objectives:

1) **Model Simplicity-** Joe Shallenburger was the target audience of our report; as such, we sought to provide a model to him that was simple, but not at the expense of its accuracy.
2) **Multi Criteria Comparisons-** In our research we discovered that a decision maker must consider several criteria when considering if an idea is patentable.
3) **Clear Outcome**- We sought a model that would clearly identify and rank criteria to provide a clear, patent, don't patent decision.

MCDM Models

Multiple criteria decision-making models(MCDM) Figure 2: MCDM High level visualization are useful in solving higher level managerial planning and decision making problems by

removing the “messes” caused in one part by helping to remove uncertainty and allowing the decision maker to solving problems that are represent by criteria. [9]

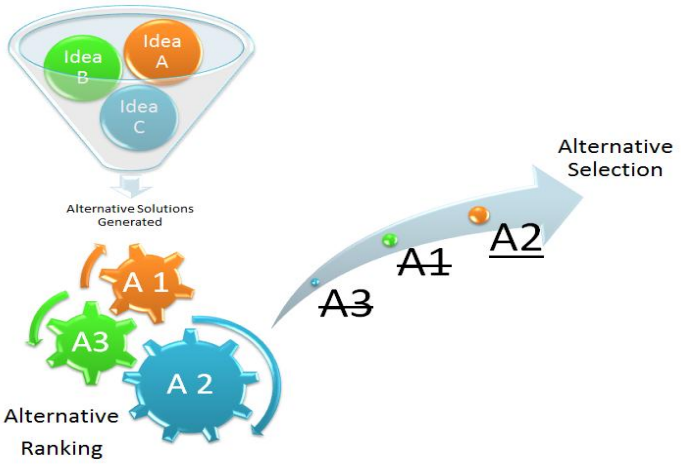


Figure 2: MCDM High level visualization

A subset of MCDM that focuses on how to evaluate alternatives helping decision makers select the optimum choices is named Multiple Attribute Decision Making (MADM). DEA, AHP, Fuzzy AHP, analytical Network Process, Fuzzy ANP, Entropy measure, fuzzy integral, dynamic weighting, neural networks weighting, fuzzy neural network, interpretive structural modeling, Fuzzy cognitive map, Linear structure equation model, Input output analysis, TOPSIS, SAWM, PROMETHEE and Gray relational Analysis, are just some of the MADM models. In the past ten years, of all MADM models written and published AHP/ANP, MAUT/MAVT, PROMETHEE, ELECTRE, and TOPSIS were the highest focus of research and thus were also considered in this work for possible models to be used for Patent selection. [10]

AHP/ANP

Analytical Hierarchy Process (AHP) and Analytic Network Process (ANP) are a family of models that use criteria and pairwise comparisons between the criteria to ascertain the relative importance of each with respect to each other. Weights and inconsistencies are found based upon algebraic methods and are utilized to apply scores to each decision alternative. Thus, the decision alternative with the highest score should be chosen. [10] AHP has “acquired wide acceptance as a method of prioritizing the elemental issues in complex problems in a variety of fields”. [11] By comparing the individual pairs of criteria, these models provide an ability to compare an issue with regards to each immediately

higher level. This in turn allows a relative importance to be determined by the decision-maker. [11] However, AHP does have limitations. The "major issue" with AHP is the accuracy of the weightings leading the paradigm to be "essentially qualitative and not realistically quantitative." Regarding AHP application within academia, AHP has been utilized within Manufacturing, environmental managements and agriculture, transportation, power and energy, healthcare, the construction industry, R&D, education, e-business and several other industries. ANP is not as widely used but has been found within literature within the areas of accounting or in areas where "Risk and uncertainty" are involved. It is "expected that ANP will gain more popularity in the future, as the benefits of ANP become better understood." [12]

MAUT/MAVT

The Multi-Attribute Utility Theory (MAUT) and the Multi-Attribute Value Theory (MAVT) are a family of models that evaluate multi-attribute problems and output the utilities of "outcomes or consequences as a function of the utilities of each attribute taken singly." [13] For example, each singular option is analyzed by the summation of the weighted score of an alternative by the decision maker's attitude towards an attribute by the range of best to worst values for an option between 0 and 1. [14] MAUT has been notes as a "Useful" tool for product selection. [15]. MAUT was also discussed as being the "Best-In-Class" performer for inventory record accuracy. It quantifies a DM's tradeoffs between two attributes; however, aggregating the utilities can be a "Challenging", also it was noted that there is a "potential for indifferences to be not known". [15], [16] Criticisms arose with both MAVT as well as with MAUT based upon a "belief that a decision analytic tool should not force all the alternatives to be comparable." [17] In addition both MAVT and MAUT when compared to ELECTRE were found to take more effort "to build". [17]

PROMETHEE/ ELECTRE

The Preference Ranking Organization Method for Enrichment Evaluation (PROMETHEE) is a family of outranking methods that support a decision maker in solving multi-criteria problems by using two phases: "The construction of an outranking relation" and the

"exploitation of this relation in order to assist the decision maker".[18] The two phases depending upon the subset model are treated in many different ways the most significant of which is the model developed due to B. Roy called Elimination and choice expressing reality (ELECTRE). ELECTRE is a set of outranking methods that have been proven to solve concrete problems. Popular in Europe ELECTRE as those who utilize this model claim that "its outranking concept is more relevant to practical situations." This paradigm extracts for each pair of alternatives from the decision maker a "concordance and discordance index." These indices then in turn demonstrate alternatives that outrank that of the other alternatives. [19] PROMETHEE was shown to be useful and relevant in practical situations for guiding a DM in selecting the best option in a multi criteria problem. It was also studied and found to be an easy approach to "solving multi-criteria problems". [18] ELECTRE has been proven to solve concrete problems, and takes less effort to build than a MAVT based method [19], [17]. However, ELECTRE doesn't always reach a conclusion when utilized [17]. We were unable to locate the limitations of the PROMETHEE method as each work found promoted its usage and didn't note any usage limitations. An example is a work on land use suitability assessment utilizing PROMETHEE. It successfully created an outranking method to aid the DM in analyzing land use suitability [20].

TOPSIS

The Technique for Preference by Similarity to the Ideal Solution (TOPSIS) is a family of methods which solve MADM problems.[19] It operates under the premise that the best alternative will have the smallest Euclidean distance from the ideal solution and furthest distance from a negative ideal solution.[19] TOPSIS has enjoyed diverse industry utilization with papers published in human resources, construction, supply chain, and many more [21], [22], [23]. TOPSIS however was found in one study to suffer from "Ranking abnormalities when an alternative is removed" [7]

Financial Methods

ATAR, Bass, Required Rate of Return, and real Options were the financial methods that we studied derived directly from the fuzzy front end of project development. The Awareness-trial-availability-repeat (ATAR) formula is used as a way to calculate the path to profit within an organization. [7] ATAR may be used as a forecasting tool that equates to the units of a particular product sold by the profit per unit. The forecasting feature allows a decision maker to conduct What-If Analysis on possible worst and best case scenarios. [7] A different mathematical equation based formula, the Bass Model, was created by Frank Bass in his work "A new Product Growth model of Consumer Durables". This model allows a decision maker to conduct quantitative predictive future sales of a product based upon historical sales of the same product. This model allows a decision maker to produce a growth curve over time based upon the initial trial probability, rate of growth in total number of purchases or the diffusion rate, total number of buyers in the target market, and the total number of purchases made for a given time period [7]. The other financial model that we considered was the required rate of return to help in deciding if an idea is patentable. The required rate of return is a calculation that allows a decision maker to understand that the higher the risk of a given product the larger the rate of return should be. Algorithmically the Rate of Return or denoted as a "hurdle" equates to the "cost of capital + Risk premium for the new product". [7] Lastly, the final financial model that we analyzed was Real Options. The real options paradigm provides a technique for organizations to expand in response to "future technological and market developments". Real as Bruce Kogut explained is "an investment in operating as opposed to financial capital," and option was explained to be as such due to the realization of the operating investment may never be realized.[24] In a legal sense, an option provides an opportunity to expand, contact, abandon or even make an operating or capital investment.

After considering these models we found one fundamental issue with their usage. This was our target customers' requirements. Joe desired to find a model that would help him decide if an idea was patentable or not as early as possible in the fuzzy front end of product

development. Taking this into consideration and evaluating for example the ATAR and Bass equations:

ATAR: **Profit = Potential × AW × T × AV × R × margin.**

- Where the number of buying units is considered to be the potential.
- AW, is the percentage of customers in the target market who the decision maker believes that will become aware of the product.
- T, is the percentage of customers who would decide to try the new product
- AV, is the percentage of business units whom can stock the new product within the product introduction period
- R, is 1 + the percentage of customers who enjoy the product so much that they become repeat customers buying more than the original unit.
- Margin, is the revenue of each product minus the cost of selling the product. [7]

Bass:

$$S(t) = pm + [q - p]\,Y(t) - (q/m)[Y(t)]$$

- **S(t),** is the future sales of a product at a future time
- **p,** represents the initial trial probability
- **q**, represents the rate of growth in total number of purchases or the diffusion rate parameter.
- **m,** denotes the total number of buyers
- **Y(t)**, represents the total number of purchases made for the given time period [7]

The potential issue with financial model utilization is that some of the above variables may not be known at an early stage. For example, the Bass model is based upon historical sales; however, if an idea may be beyond that of the company's original historical sales data. A different example is with regards to the ATAR model's T variable. Based upon the same aforementioned principle the trial percentage of customers may not be known.

Patent Portfolio Analysis

There are also some technology portfolio tools to help companies manage the allocation of R&D resources effectively. Patent portfolios prove to be a very useful tool for R&D decision makers in companies. One article [25]introduces two types of patent portfolios for strategic R&D planning . In this paper, patenting strategies of companies are characterized according to two different dimensions: patent activity and patent quality. This is shown in the following list and Figure 3: Patent Portfolio for Technology Monitoring [25].

4. Patent quality index:
    5. ratio of granted to filed patents
    6. international scope
    7. technological scope
    8. citation frequency
- Patent activity index:
    - Patent applications of firm relative to number of employees
    - Patent applications of firm relative to R&D spending

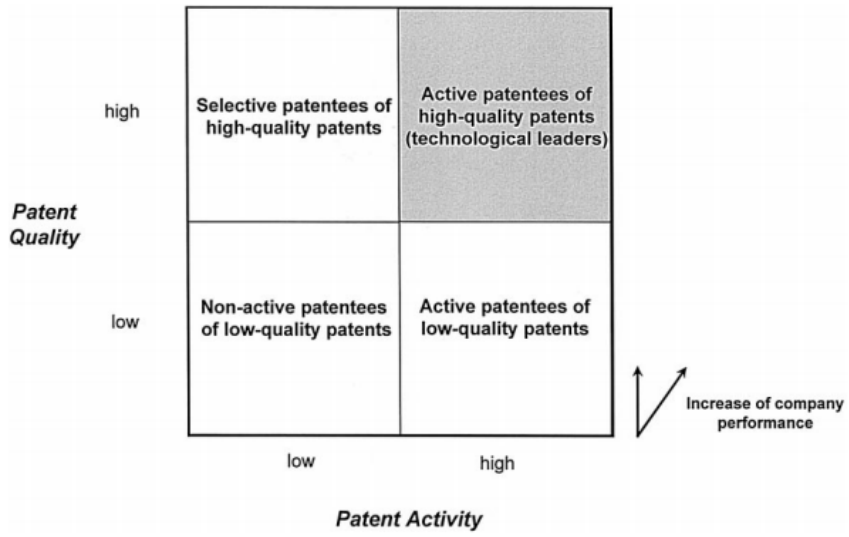


Figure 3: Patent Portfolio for Technology Monitoring [25]

General patent portfolio analysis framework is a valuable tool to support the effective allocation of scarce R&D resources. However, this is very subjective evaluation method of technological positions, depending on interviewed experts. The allocation of patents to

technological fields is the prerequisite for drawing patent portfolios. Several attributes are shown in the following list and Figure 4: Patent portfolio on the level of technology fields.[25].

- Relative patent position
    - Strongest patentee as benchmark, if all companies compete with each other
    - Strongest competitor as benchmark, if there is reciprocal competition
    - Inclusion of further quality indicators of patents
- Technology attractiveness
    - Predominant use of objective criteria
    - Growth rates based on main- and supplementary classification of patents
    - Relative growth rates; recent development of patent growth
    - Total level of patent applications
    - Validation of objective criteria by subjective evaluation

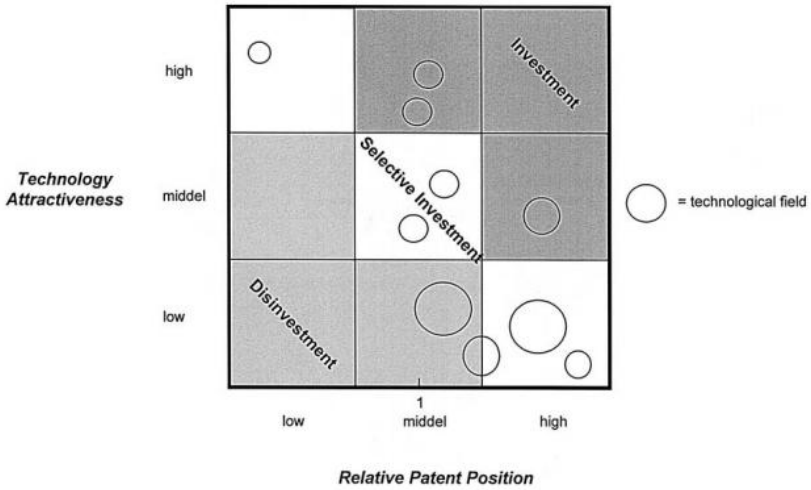


Figure 4: Patent portfolio on the level of technology fields.[25]

The real strength of patent portfolio methods is that they can be analyzed to estimate what an appropriate model for analyzing patents in the FFE.

Model Selection:

To recap, it became evident during the course of our research that we were thinking about the problem using several criteria, not as to which belong in the model but as to which would determine the model itself. It is evident that the very nature of the FFE reduces the overall data available, and so the model should be able to work off of relatively few factors, which in turn excludes the financial models. However, not all factors are created equally (as our next section will show) and so the model should also take into account the relative importance of each factor. Our initial conversations with Joe Shallenberger [26] revealed that many companies already use financial methods to analyze their IP decisions, so our model did not need to go into those matters. Of course, this model is only useful if the usability is quite high, and the simple question being asked is "Do we proceed with the IP process or not" so a discrete positive or negative result is all that is required.
The model chosen represents a variant of MAVT utilizing Simple Additive Weighting (SAW)[27] to formulate a relatively simple score that can be easily understood and used. As this model met our three guiding requirements the best in our opinion based upon the aforementioned review. Please read the Results section for details on the model itself.

What makes a good IP evaluation method in the FFE?

Every method exists for some reason, but not every method is appropriate or even possible during the FFE phase of a project. In general, uncertainty can be quite high during this early development phase [28] and so decisions must be made with limited data. However, certain fundamental aspects of the project are often known even at this early stage. The best methods will capitalize on what is known and mitigate uncertainty about what is still unknown. To that end, we have analyzed the literature to discover what key criteria are involved in IP evaluation, and will consider how these fit into the FFE.

In order to properly analyze patents and patent methods, one should first consider the core of the patent, a new idea.

At the FFE stage, idea evaluation with regard to applicable standards and implementation requirements results in a decision to discard, revise, or invest in the idea. There are some

articles which regard idea evaluation in a philosophical context. One study [29] was undertaken to determine how small companies differ in their idea evaluation. It points out that in case of small firms, evaluation is mainly concerned with marketing and technical feasibility. Surveys showed what kinds of evaluation process such as first-stage screening, in-process evaluation, market place evaluation, and financial evaluation, differ within companies depending on their size. Another paper[30] pointed out pitfalls or errors in idea evaluation, in that people may underestimate the originality of highly novel new ideas, and optimistic points of view may lead people to underestimate the time and resources needed to implement new ideas . However, the degree of originality is an important criteria which the ideal method should take into account.

One paper[5] identified four main dimensions having two measurable sub-dimensions for each of them to assess the new idea quality or creativity. These dimensions are identified in Figure 5: Definitions of quality dimensions and sub-dimensions. [5]

Dimension	**Definition**
Novelty	The degree to which an idea is original and modifies a paradigm
Originality	The degree to which the idea is not only rare but is also ingenious, imaginative, or surprising
Paradigm relatedness	The degree to which an idea is paradigm preserving (PP) or paradigm modifying (PM). PM ideas are sometimes radical or transformational
Workability (Feasibility)	An idea is workable (feasible) if it can be easily implemented and does not violate known constraints
Acceptability	The degree to which the idea is socially, legally, or politically acceptable
Implementability	The degree to which the idea can be easily implemented
Relevance	The idea applies to the stated problem and will be effective at solving the problem
Applicability	The degree to which the idea clearly applies to the stated problem
Effectiveness	The degree to which the idea will solve the problem
Specificity	An idea is specific if it is clear (worked out in detail)
Implicational explicitness	The degree to which there is a clear relationship between the recommended action and the expected outcome
Completeness	The number of independent sub-components into which the idea can be decomposed, and the breadth of coverage with regard to who, what, where, when, why, and how

Figure 5: Definitions of quality dimensions and sub-dimensions. [5]

The innovating firm ultimately needs to decide simply whether to pursue patent protection or drop it. Investment in the idea is efficient only if the return is sufficiently higher than the cost. Many types of uncertainty are also involved in the early life of the patent application. However, there is little significant literature on the return on investment of patents. This is obviously important to all firms, but it is inextricably tied to internal metrics and so each firm must ultimately handle this aspect themselves. Some papers [31] mainly focus on national level and industry level effect of patents filed in order to compare between countries . Methodologies to value patents are summarized as follows in Figure 6: Patent valuation methods in order of sophistication [32].

Cost	Cost based methods
Market Conditions	Market based methods
Income	Methods based on projected cashflows
Time	DCF Methods allowing for the time value of money
Uncertainty	DCF Methods allowing for the riskiness of cashflows
Flexibility	DCF based Decision Tree Analysis (DTA) methods
Changing Risk	Option Pricing Theory (OPT) based methods
	a) Discrete time: Binomial Model (B-M) based methods b) Continuous time: Black-Scholes (B-S) option pricing model based methods.

Figure 6: Patent valuation methods in order of sophistication [32]

When examining what makes a good IP evaluation method, it is chiefly important to understand the reason companies choose to pursue patent protection. One recent paper which covers this [33] discusses the "Games of Innovation" model and revealed 11 common strategies within given industries. The chief variables amongst these strategies were the "time-to-prototype" and the "time-to-market." Where both timelines are long, patents may

actually expire before the full extent of the product is understood in the marketplace, but also this breaking of new ground can present a ripe field for defensive patents to cut off competition. Patent quality is still expected to be high, however, as "when the field becomes more crowded, the original art is likely to be subjected to scrutiny."
Conversely, where timelines are short and barriers to market entry are low, "patent filing rates...tend to be low...as derivative work is protected by trade secret." This well establishes that a significant variable is patent quality (broadness/defensibility of claims) as well as "fit" to a given corporate strategy or business model. Both of these items should be relatively well understood by a development team, even during the FFE.
A patent's fit to corporate strategy was also addressed in another article [38] which discussed the role of the executive in patent strategy. This paper addressed 5 "IP strategy scopes" shown below in Figure 7: Strategy scopes within IP [34] which also addresses the difference between corporate and functional level strategies. This can be another key during the FFE as the functional level can often spend significant effort prior to high-level management's involvement or even knowledge of the idea. This paper also found a correlation between "IP rules and IP performance" stating that "clear-cut rules about IP at the functional level" allow managers to save time – which makes sense in the context of a quick-moving team. If every decision was forced upstairs to a high-level manager then overall productivity could drastically slow down.

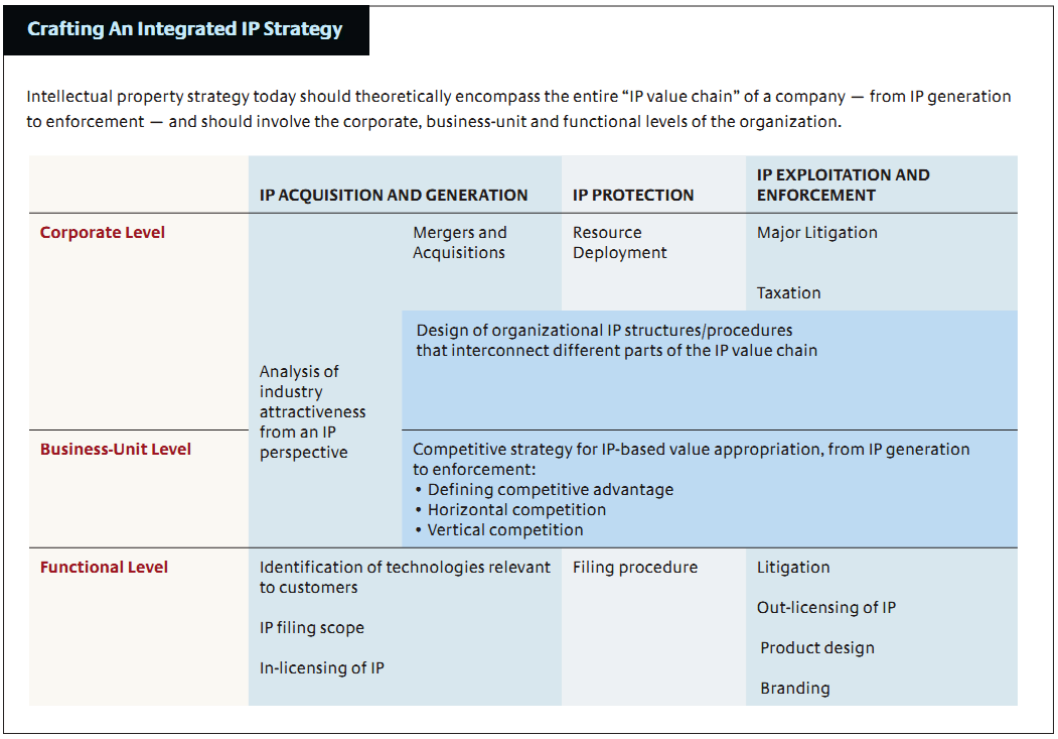


Figure 7: Strategy scopes within IP [34]

Another avenue of evaluation methods concerns monetary value, or potential value as estimated during the FFE. The monetary value of a patent is a question unto itself but there are insights to be gleaned for the FFE process. Patent value can be judged either by potential market value (estimated based on market data and/or predictions) or by relative merit within the IP community (judged by number of citations a patent receives from other patents). Obviously these citations can take a long time to gather and so are not much help within the FFE, but a company's existing portfolio can provide clues to future worth. One paper which discussed this [35] estimated that an additional patent citation (per patent) could boost stock market value as much as 3%, and specifically that "past citations clearly help in forecasting future returns". It went on to discuss "self-citations", defined as patents which build upon each other within the same firm. These internal citations can be regarded as a sign of a "strong competitive position" in which the company is in position to capitalize not only upon the original idea but also subsequent applications thereof. Thus, the potential for citations acts as a different method of ranking patent quality and must also be regarded as significant to deciding whether or not to patent, and luckily a firm is always in a unique position to capitalize upon their own IP history.

Another way to look at patent valuation is through the iterative steps of the patent process itself, discussed in a significant (if somewhat dated) paper out of Oxford [32]. This paper not only discusses several methods of patent valuation (discussed in more detail earlier in Figure 6: Patent valuation methods in order of sophistication [32]) but also discusses the workflow of the patent process itself along with the costs at each level. These options can be seen below in Figure 8: Patent option valuation decisions [32].

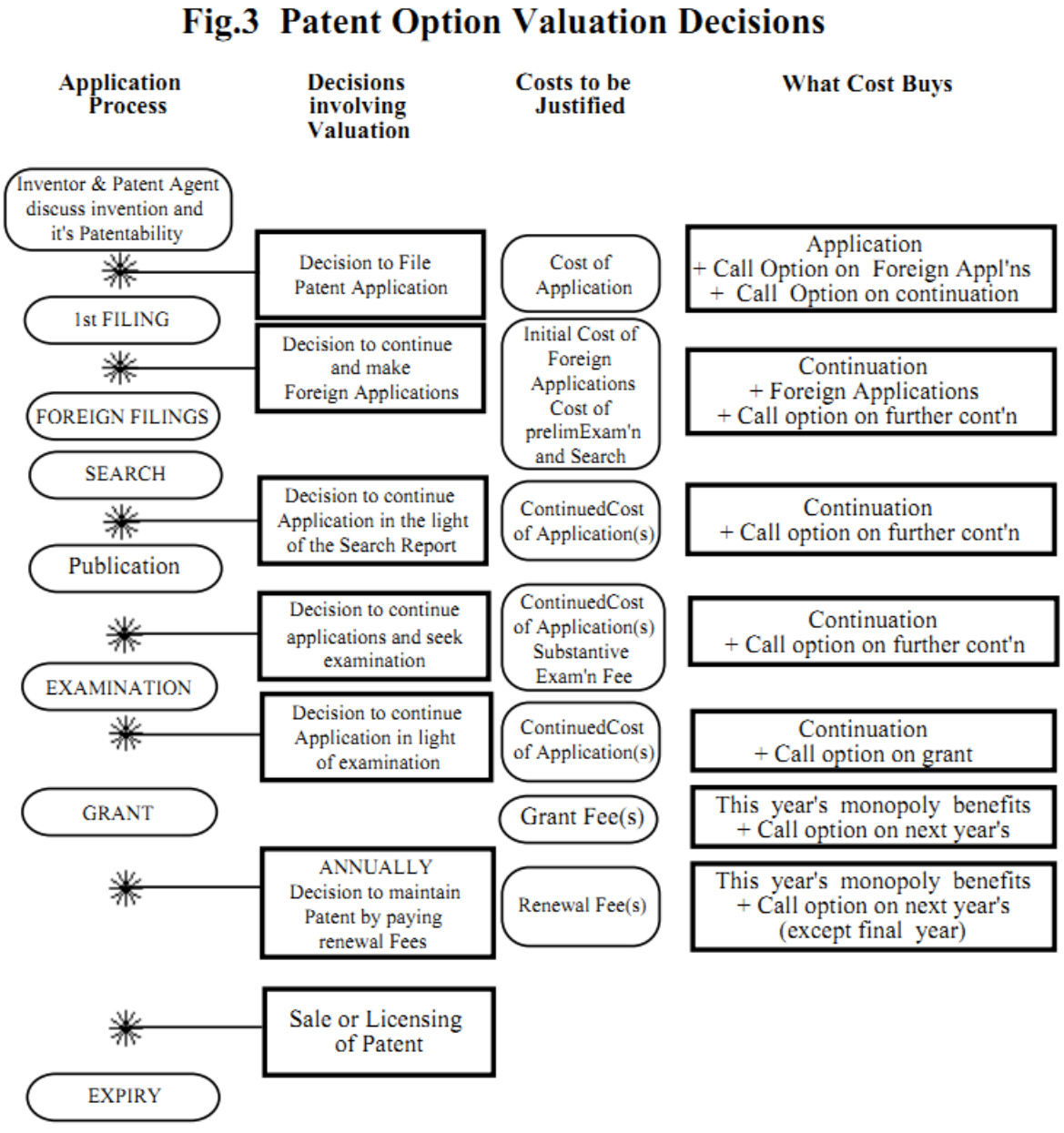


Figure 8: Patent option valuation decisions [32]

Given that this process extends into several years, much of the valuation must be performed by the time of the first filing to fit within the FFE, securing the so-called "call option" on the remainder of the process. Therefore an important part of the FFE IP strategy should be the ability to evaluate future options in light of the continuing costs of IP protection. The question should be asked "Does this method help to consider the lifecycle of the patent?"

One recent paper from the ETM program at PSU covers a lot of ground in this area [28]. While this paper was primarily focused on the decision between spinning off a project versus developing it internally, many similar factors are considered during IP evaluation. The model proposed covers several stages, seen below in Figure 9.

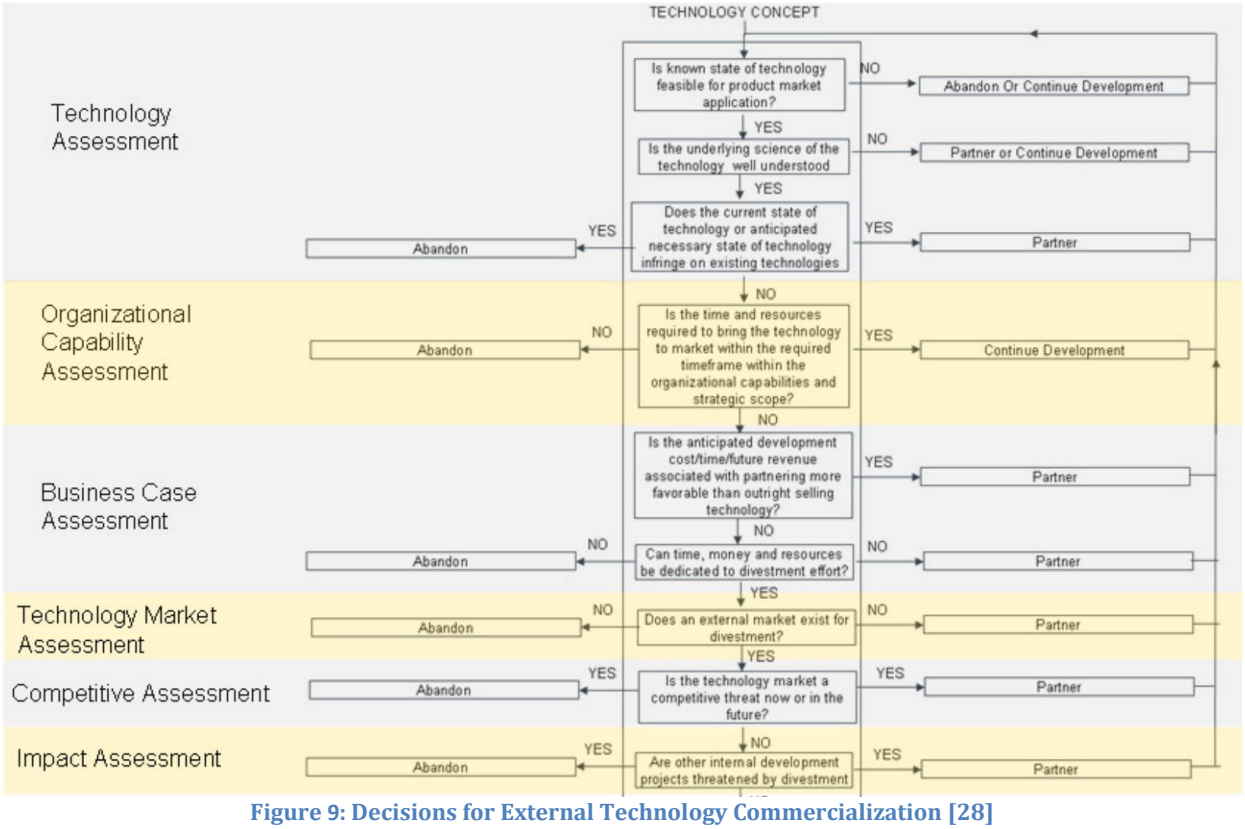


Figure 9: Decisions for External Technology Commercialization [28]

These stages include (among others) a technology assessment, organizational capability assessment, and a competitive assessment. The technology and organizational assessments are important as sometimes IP is generated that would not be feasible to develop internally, even if it has a large potential value outside your area of expertise. The competitive assessment is important for reasons which relate back to the corporate

strategy of a firm. The term "patent fences" [33] is used to indicate defensive patents which create a clear space around a current line of innovation, even if these patents themselves are not specifically targeted for further development. As stated [32], this consideration should be made not just for the current timeframe, but also for the future life of a company.

To summarize, the ideal method for evaluating IP in the FFE should include [in no particular order]:

Major Criteria	**Minor Criteria**
Degree of Originality	-
Potential Return on Investment	Commercial Value of Product
	Perceived Value to Stakeholders
Development Cycle	Time To Prototype
	Time to Market
Potential Patent Quality	Broadness
	Strength of Claims
	Potential for Internal Citations
Corporate Strategic Fit	Within Development Group
	Within Company at Large
Patent Lifecycle Process	Time
	Cost
Technology Assessment	-
Competitive Assessment	-

It is important to note that not all of these criteria are independent. Corporate Strategic Fit, for instance, could trump Patent Quality if it was the goal of management to obtain large

quantities of patents for the sake of Perceived Value to Stakeholders (ie corporate shareholders). These criteria will be pared down to eliminate redundancies and judged in the next section.

Results

In the first section of the paper, we identified a method that could be used for the patent decision process in the FFE. This weighted scoring method required us to identify the key criteria. The key criteria in patent selection are identified in the second section of the paper. Now we need to apply weights to the criteria. In order to define these weights, we sent a survey to professionals currently involved with the patent selection process. A sample of this feedback is shown below:

5 - Impact on competitors
5 - Quality of patent / broadness of claims
4 - Idea Novelty / Originality
4 - Idea Quality / Completeness
4 - Alignment with company IP strategy – offensive/defensive
3 - Technological Viability
3 - Product feasibility (overall)
2 - time-to-market / development cycle
2 - Resources required / Technical capabilities
2 - Alignment to Strategic Business Units vision.
2 - Product fit to current business model
1 - Market Acceptability
1 - Target market understood
0 - Lifespan of Patent

Feedback from Joe Shallenberger[26]

We averaged the weights provided in each survey and completed the following weighted scoring model:

Factor	Weights	Score (0-5)	Weighted Score	
Impact on competitors	5		0	
Quality of patent / Broadness of claims	4.833333333		0	
Idea Novelty / Originality	4.333333333		0	
Idea Quality / Completeness	4.166666667		0	
Alignment with company IP strategy	4.833333333		0	
Technological viability	3.833333333		0	
Product feasibility (overall)	3.833333333		0	
Time-to-market / Development cycle	3.333333333		0	
Resources required / Technical capabilities	3.333333333		0	
Alignment to strategic business unit's vision	3.666666667		0	
Product fit to current business model	4		0	
Market acceptability	3.666666667		0	
Target market understood	4		0	
Lifespan of patent	2.833333333		0	
		Max Possible	Total Score	Percentage
		278.3333333	0	0

Figure 10: Patent Selection Scoring Model

The basic weighted scoring model is constructed as follows:

$$Tot = \sum_{j=1}^{n} (W_j * S_j)$$

n: number of criteria

S_j : Score for potential patent in criterion j

W_j : Weight of j criterion

Tot : Total Score

The potential patent is scored for based on each factor. The scores are multiplied by the weights to create the weighted scores. The weighted scores are totaled and a percentage is calculated based on the maximum possible. This percentage can then be used to help with the go/no go decision for a potential new patent.

Case Studies

To help validate the model, we tested it using three case studies. In these cases, we had the advantage of hindsight, but this is still a valid test because we can see if the final score aligns with the success or failure of the patent.

Case 1

The first case study was focused on an idea that was not patented. In this case, the developer of the idea felt that this was a valuable opportunity lost. We tested the idea according to the model to see how it would score. The basic concept was for a product that is very well known today: the USB flash drive. The idea was conceived before this was a product that existed in the market. The idea covered the form factor, the hardware, and the software drivers to make it work. It did not cover the USB standard which was intentionally not patented by Intel to help encourage its adoption.

The developer scored the idea as follows:

Factor	Weights	Score (0-5)	Weighted Score	
Impact on competitors	5	4	20	
Quality of patent / Broadness of claims	4.83333333	4	19.33333333	
Idea Novelty / Originality	4.33333333	4	17.33333333	
Idea Quality / Completeness	4.16666667	4	16.66666667	
Alignment with company IP strategy	4.83333333	4	19.33333333	
Technological viability	3.83333333	4	15.33333333	
Product feasibility (overall)	3.83333333	5	19.16666667	
Time-to-market / Development cycle	3.33333333	5	16.66666667	
Resources required / Technical capabilities	3.33333333	4	13.33333333	
Alignment to strategic business unit's vision	3.66666667	5	18.33333334	
Product fit to current business model	4	5	20	
Market acceptability	3.66666667	5	18.33333334	
Target market understood	4	5	20	
Lifespan of patent	2.83333333	5	14.16666667	
		Max Possible	Total Score	Percentage
		278.333333	248	89.1017964

We can see that this idea scored fairly well at 89%. The following table describes some of the thoughts behind the scores in the model:

Impact on competitors	Strong due to preventing all others from creating a product like this
Quality of patent / Broadness of claims	Broad patent due to general product concept
Idea Novelty / Originality	This was a new idea. Nothing like this existed on the market
Idea Quality / Completeness	The idea was complete. It was a complete hardware and software solution
Alignment with company IP strategy	This is exactly the kind of concept that the company typically patented
Technological viability	Technology existed and was ready to be adapted
Product feasibility (overall)	Completely feasible, simply a new application for existing technology
Time-to-market / Development cycle	Could be developed quickly and ready to go to market
Resources required / Technical capabilities	Well within the technical capabilities of the company
Alignment to strategic business unit's vision	This aligned with the BU vision of creating unique peripherals
Product fit to current business model	Easily fit within existing business model
Market acceptability	The market for a product like this was clearing there
Target market understood	These would be the customers that the company was very familiar with
Lifespan of patent	Patent was applicable for several years. No obvious replacement on the horizon

Based on these score, the model would suggest that this could have been an idea worth patenting.

Case 2 and 3

For cases 2 and 3 we interview the Senior Manager of IP strategy at Logitech. He proposed 2 cases. The first was considered a strong patent that is considered fundamental IP in a key technology area. The second patent was related to a single niche product. The scores are as follows:

"fundamental IP in a key technology area"

Factor	Weights	Score (0-5)	Weighted Score
Impact on competitors	5	5	25
Quality of patent / Broadness of claims	4.83333333	3	14.5
Idea Novelty / Originality	4.33333333	4	17.33333333
Idea Quality / Completeness	4.16666667	5	20.83333334
Alignment with company IP strategy	4.83333333	5	24.16666667
Technological viability	3.83333333	5	19.16666667
Product feasibility (overall)	3.83333333	4	15.33333333
Time-to-market / Development cycle	3.33333333	4	13.33333333
Resources required / Technical capabilities	3.33333333	5	16.66666667
Alignment to strategic business unit's vision	3.66666667	5	18.33333334
Product fit to current business model	4	4	16
Market acceptability	3.66666667	3	11
Target market understood	4	3	12
Lifespan of patent	2.83333333	5	14.16666667

Max Possible	Total Score	Percentage
278.333333	237.8333333	85.4491018

"single niche product"

Factor	Weights	Score (0-5)	Weighted Score
Impact on competitors	5	3	15
Quality of patent / Broadness of claims	4.83333333	5	24.16666667
Idea Novelty / Originality	4.33333333	3	13
Idea Quality / Completeness	4.16666667	3	12.5
Alignment with company IP strategy	4.83333333	2	9.666666666
Technological viability	3.83333333	5	19.16666667
Product feasibility (overall)	3.83333333	5	19.16666667
Time-to-market / Development cycle	3.33333333	5	16.66666667
Resources required / Technical capabilities	3.33333333	2	6.666666666
Alignment to strategic business unit's vision	3.66666667	2	7.333333334
Product fit to current business model	4	2	8
Market acceptability	3.66666667	5	18.33333334
Target market understood	4	5	20
Lifespan of patent	2.83333333	1	2.833333333

Max Possible	Total Score	Percentage
278.333333	192.5	69.1616766

As anticipated, the broader patent in the key technological area scores much higher than the patent for the niche product. This begins to validate our model. If the scores had not reflected the importance of the patents, we would know that the correct factors were not being considered.

Discussion

After researching the current available FFE decision tools, MCDM's, and portfolio management techniques, we found that a weighted scoring method could be effectively applied to the patent decision process. The MCVT's model selection was driven by the need for a paradigm that was simplistic but accurate, evaluated all criteria, and provided clear direction to the Patent Attorney utilizing the model. It was not our intention to indicate that any of the other models could not have been utilized, but rather due to the evaluation of each limitation and advantage we choose to move forward with the MCVT based model. Our effort in finding the perfect model was in the words of Joe Shallenberger like finding "the meaning of life." To that end, there is a large opportunity to expand upon our base research to evaluate additional methods that may fit for this purpose.

Once we had identified this method, we researched which criteria should be included in the model. These criteria were sent to professionals involved in the patent selection process for weighting. The weights and criteria were entered into the model and the model was tested with three case studies. The sample set was based upon 5 respondents within Oregon. To adequately represent the nation in the future, our survey could be distributed to a more geographically dispersed sample set of the total populous.

The results of the case studies show that this model could be an effective tool for identifying ideas that should be patented. A company may want to tailor the model that we have provided to best fit their own application. In this case, they could adjust the weights and add or subtract criteria.

The weights in the model are provided by IP experts with current experience in patent filing in new product development. This value is quite subjective; other decisions might provide different weights, depending on their particular experience. Survey produces weighted score of each criterion. More survey pool should be required to validate these values by averaging judgments of several experts.

Conclusion

In order to create a more universal and reliable model, future research could complete a more comprehensive survey that includes more participants. More case studies could be completed to help create a scale for rating the outputs from the model. For example, a company could look at a list of successful patents, rank each one retrospectively using the model and then use the scores of the successful patents as a benchmark for future decision making.

We would recommend benchmarking a whole portfolio of patents with the model. In addition, patents should be evaluated using the model when filed, and then evaluated again after the patent issues to demonstrate the accuracy of the model.

The weighted scoring model proposed in this paper could be effectively used in conjunction with other tools and methods to help select which ideas should be patented in the Fuzzy Front End such as Real Options. Given the added pressure of the new patent laws, and ever shrinking budgets, a tool like this could be essential for many companies to achieve IP success.

Acknowledgements

Without the guiding assistance from Joe Shallenberger and Dr. Antonie Jetter our work would not have been possible. We appreciate the time spent by Narkowitz, Herbold, Glade & Mehlhaf, Marger Johnson & McCollom, and General Counsel at C&K Market, Inc. in assisting us in weighting our criteria within our model. Finally, we would like to thank Shimon Shmueli and Kevin Mclintock in helping us validate our models' accuracy with useful case studies.

Bibliography

[1] Malakoff, D, (9-2011)"Patent Reform Shuffles Who Is First in Line," *Science*, vol. 333, no. 6049, pp. 1559-1560

[2] Abrams, DS, Wagner, RP, (2011) "Priority Rules: An Empirical Exploration of First-to-Invent Versus First-to-File," *U of Penn, Inst for Law and Econ*,

[3] Brem, A., Voigt, K. I., & Technology Management in the Service Economy. (May 01, 2009). Integration of market pull and technology push in the corporate front end and innovation management-Insights from the German software industry. *Technovation, 29,* 5, 351-367.

[4] Ernst, H. (January 01, 2003). Patent information for strategic technology management. *World Patent Information, 25,* 3, 233-242.

[5] Dean, D. L, Hender, J. M., Rodgers, T. L."Identifying Quality , Novel , and Creative Ideas : Constructs and Scales for Idea Evaluation 1," *Information Systems*, vol. 7, no. 10, pp. 646-699.

[6] Hall, R, (Feb., 1992) The Strategic Analysis of Intangible Resources Richard Hall *Strategic Management Journal* , Vol. 13, No. 2 , pp. 135-144

[7] Crawford, Charles, M, Benedetto C. A. Di. (2011) *New Products Management*. New York: McGraw-Hill Irwin,. Print. pp 19-267

[8] Chiu, YJ, Chen, Yuh-Weh (2007) Mathematical and Computer Modelling, Vol 46, p 1054-1062

[9] Stewart, TJ, (September-November 1992) A critical survey on the status of multiple criteria decision making theory and practice, Omega, Volume 20, Issues 5-6,, Pages 569-586, ISSN 0305-0483, 10.1016/0305-0483(92)90003-P.]

[10] Huang, Ivy B, Keisler, Jeffrey, Linkov, Igor (1 September 2011) Multi-criteria decision analysis in environmental sciences: Ten years of applications and trends, Science of The Total Environment, Volume 409, Issue 19,, pp 3578-3594.

[11] Donegan, H. A., Dodd, F. J., & McMaster, T. B. M. (January 01, 1992). A New Approach to AHP Decision-Making. *The Statistician, 41,* 3, 295-302.

[12] Sipahi, S., & Timor, M. (June 01, 2010). The analytic hierarchy process and analytic network process: an overview of applications. *Management Decision, 48,* 5, 775-808.

[13] Torrance, G. W. (1982)."Application of Multi-Attribute Utility Theory to Measure Social Preferences for Health States". *Operations research(0030-364X)*, 30(6), p.1043

[14] Sarabando, P. (2009)"Multiattribute Choice With Ordinal Information: A Comparison of Different Decision Rules". IEEE transactions on systems, man and cybernetics. Part A, Systems and humans(1083-4427), 39(3), . p.545.

[15] Dolan, B., & Lewis, K. (December 01, 2008). Robust product family consolidation and selection. *Journal of Engineering Design, 19,* 6, 553-569.

[16] Terry, R. C., Manuel, D. R., Heather, L. N., & James, R. O. (January 01, 2006). The use of multi-attribute utility theory to determine the overall best-in-class performer in a benchmarking study. *Benchmarking: an International Journal, 13,* 4, 431-446

[17] Simpson, L. (July 01, 1996). Do Decision Makers Know What They Prefer?: MAVT and ELECTRE II. *Journal of the Operational Research Society, 47,* 7, 919-929.

[18] Brans, J. P. (1985). "Note--A Preference Ranking Organization Method: (The PROMETHEE Method for Multiple Criteria Decision-Making)". *Management science(0025-1909)*, 31(6), p.647.]

[19] Zanakis, S (1998). "Multi-attribute decision making: A simulation comparison of select methods". European journal of operational research(0377-2217), 107(3), p.507.]

[20] Marinoni, O. (January 01, 2006). A discussion on the computational limitations of outranking methods for land€use suitability assessment. *International Journal of Geographical Information Science, 20,* 1, 69-87.

[21] Panagiotis, V. P., & Ioannis, G. (January 01, 2009). A fuzzy multicriteria decision-making methodology for selection of human resources in a Greek private bank. *Career Development International, 14,* 4, 372-387.
[22] Yong-tao, T., Li-yin, S., Craig, L., & Yan, L. (January 01, 2010). Construction project selection using fuzzy TOPSIS approach. *Journal of Modelling in Management, 5,* 3, 302-315.
[23] Selçuk, P. (January 01, 2008). Use of fuzzy AHP for evaluating the benefits of information-sharing decisions in a supply chain. *Journal of Enterprise Information Management, 21,* 3, 263-284.
[24] Kogut, B. (1991)"Joint Ventures and the Option to Expand and Acquire." *Management Science*. 37.1 : 19-33. Print.
[25] Ernst, H(Sep. 1998.)"Patent portfolios for strategic R&D planning," *Journal of Engineering and Technology Management*, vol. 15, no. 4, pp. 279-308,
[26] Personal Communication (e-mail) – Joe Shallenberger
[27] Dias, LC, Antunes, CH, "Multiattribute Value Theory: Additive Models" [Online], VR_COI002 "Open Access Materials": http://www.vrtuosi.com/oam/vr-coi002-multicriteria-decision-analysis Accessed 11/2011
[28] Trippel, M(Nov. 2010) "A Comprehensive Strategic Model for the External Commercialization of New Product Development", PSU,
[29] Crawford, C. M. (1980.)"THE IDEA EVALUATION FUNCTION IN SMALLER FIRMS," *Journal of small business management*, p. 31,
[30] Licuanan, B.F, Dailey L. R, Mumford M. D., (2007)"Idea evaluation : Error in evaluating highly original ideas," *Journal of creative behavior*, vol. 41, no. 1, pp. 1-28,
[31] Heher, A. D. (Jul. 2006)"Return on Investment in Innovation: Implications for Institutions and National Agencies," *The Journal of Technology Transfer*, vol. 31, no. 4, pp. 403-414,
[32] Pitkethly, R. H., & Judge Institute of Management Studies. (1997). *The valuation of patents: A review of patent valuation methods with consideration of option based methods and the potential for further research*. Cambridge: Judge Institute of Management Studies.
[33] Germeraad, Paul, (May/June 2010) Integration of intellectual property strategy with innovation strategy, Research and Technology Management – Volume 53 Number 3
[34] Reitzig, Marcus (Fall 2007) "How Executives can Enhance IP Strategy and Performance", MIT Sloan Mgmt Review –
[35] Hall, Bronwyn, Jaffe, Adam, Trajtenberg, Manuel (Spring 2005) Market Value and Patent Citations, RAND Journal of Economics Vol 36 #1

Appendices

Appendix A – Core Article Taxonomy

Title	Citation	Journal Type	Abstract	Method	Conclusions
Market value and patent citations	RAND Journal of economics vol 36 #1 spring 2005	Academic	patent citations as measure of firm's importance, based on stock market valuation	1963-1995 History – Tobin's q equations	unpredictable citations are strongest. Self-citations better than external. Only works in longer term once citation data is available
Determinants of Patent Value: Insights from a simulation analysis	Technological Forecasting & Social Change 77 (2010)	Business	Monte Carlo simulations from case study to rate value of patent protection	real options to make theoretical model of value	patent protection is worth more than unpatented projects, but by smaller margin than expected
An intellectual property-based corporate strategy: An R&D spend, patent, trademark, media communication, and market price innovation agenda	Scientometrics vol 80 #3 (2009)	Academic	Agenda is proposed and investigated, using correlation analysis		novel link between economic metrics, strategy and innovative firms
A dilemma for developing countries in intellectual property strategy? Lessons from a case study of software piracy and Microsoft in China	Science and Public Policy vol 32 #3 June 2005	Academic	Examine dilemmas of dev. Countries in response to harmonized global IP	does weak IP hamper development? Does delayed compliance overcome?	Imposition of global IP may not be effective and may not promote innovation "per se"
Effecting a comprehensive intellectual property strategy using the Madrid Protocol	Nature Biotechnology Vol 22 #5 May 2004	Technical	Madrid protocol covers global trademark harmonization		Trademarks in biotech produce value especially as "real" names are so difficult
Evaluating Inventions from Research Institutions	Intellectual Property Management in Health and Agricultural Innovation (2007) Chapter 9.1	Academic	Analyze three key decisions: Do we patent? Do we spin off? How much do we charge?	technology transfer office asks big checklist	"more art than science" Success requires PD, mfg, and market knowledge including comp. Pricing competent deal is much better than "best deal ever"

How Executives can Enhance IP Strategy and Performance	MIT Sloan Mgmt Review – Fall 2007	Business	Factor analysis – full IP v trademark control v. licensing v branding v. defensive R&D	corporate survey	No single best approach common success requires "genuine corporate involvement" Also clear-cut rules for func. Managers increase overall IP performance
How patent vulnerability impacts valuation	CPA Journal – Nov 2010	Business	patent valuation seen as marketing expense, but is there actual value?	list patent features and uncertainty	valuation is hard and requires much knowledge, function of revenues and also timing of transaction and negotiation skills
Integration of intellectual property strategy with innovation strategy	Research and Technology Management – Volume 53 Number 3 May/June 2010	Business	Consider patent's role in overall company strategy	Study of company patent portfolios	Best practices vary by time-to-market & time-to-prototype – matrix developed based on company markets and strategy level
Intellectual property rights, strategy, and policy	Econ Innoc New Technique Vol 13 #5 July 2004	Academic	Examine impact of major trends on patent importance	Introductory essay of changing rights and implications	patents are more valuable, but less effective in motivating R&D as well as decreased social benefits – reforms recommended
Magnetic Intellectual Property: Accelerating revenues from innovation	Journal of Business Strategy – May/June 2003	Business	IP Strategy – how to increase profits?		no one function directly responsible for IP, corporate silos, no good system for allocating funds (internally, compared to VC systems)
Patent evaluation of inventions as an object of simulation and automation	Scientific and Technical information processing vol 27 #5 (2000)	Academic	patent sphere examined from systems approach and information theory	area classified as large syste, cybernetic approach suggested	list of many characteristics of the problem/system
Globalization of Intellectual property rights and innovation in services	J Industry Competition Trade Vol 8 (2008)	Academic	review relationships between service industry and IP protection	review of survey evidence	service sectors have not used IP but may start to soon? Gaps in policy regimes

					should be filled to facilitate this
The Valuation of Patents	New Developments in Intellectual Property Law and Economics March 1997	Academic	patent value constantly needs assessing through entire lifecycle process	review of patent valuation methods – option based methods and further research	Option based methods, econometric methods, real options, discounted cashflow methods, income based methods
Using AHP in patent valuation	Mathematical and computer modeling vol 46 (2007)	Academic	intangible asset valuation is important, propose objective scoring system	value new products being developed	C company satisfied with their work on new mp3 player – multiple industries need studying, only licensor side of equation
The Idea Evaluation Function in Smaller Firms	*Journal of small business management*, p. 31, 1980	Business	small firm must innovate or perish and evaluate ideas efficiently	survey small firms about procedures	small firms do not do much formal testing and do little "real r&d" but they may not need to in fact
Idea evaluation: error in evaluating highly original ideas	Journal of Creative Behavior, vol 41 #1, 2007	Academic	Tendency exists to undervalue original thought but active analysis methods can help	sample undergrad psych majors in team environment	people to undervalue the new because it is new!
Identifying Quality , Novel , and Creative Ideas : Constructs and Scales for Idea Evaluation	*Information Systems*, vol. 7, no. 10, pp. 646-699.	Academic	Improve tools and methods to support idea generation	Examine 90 studies on creativity	evaluate new ideas based on novelty, workability, relevance, and specificity, proven with subgroups to provide balanced set of dimensions

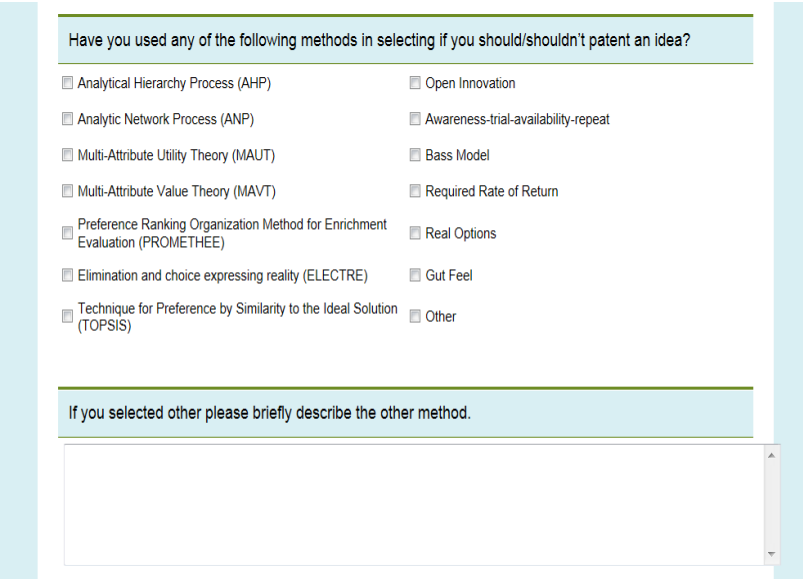
Appendix B – Definitions and Acronyms

Sl.No.	Acronym / Abbreviation	Description
1	FFE	Fuzzy-Front-End
2	AHP	Analytical Hierarchy Process
3	IP	Intellectual Property
4	MCDM	Multiple Criteria Decision-Making

5	DEA	Data Envelopment Analysis
6	AHP	Analytical Hierarchy Process
7	ANP	Analytic Network Process
8	TOPSIS	Technique for Order Preference by Similarity to Ideal Solution
9	SAWM	Simple Additive Weighting Method
10	PROMETHEE	Preference Ranking Organization Method for Enrichment Evaluation
11	MADM	Multiple Attribute Decision Model
12	ELECTRE	Elimination and Choice Expressing the Reality
13	TOPSIS	Technique for Preference by Similarity to the Ideal Solution
14	MAUT	Multi-attribute Utility Theory
15	MAVT	Multi-Attribute Value Theory
Sl.No.	**Acronym / Abbreviation**	**Description**
16	ATAR	Awareness-Trial-Availability-Repeat
17	PM	Paradigm Modifying
18	PP	Paradigm Preserving
19	DCF	Discounted Cash Flow
20	DTA	Decision Tree Analysis
21	OPT	Option Pricing Theory
22	B-M	Binomial Model
23	BS	Black-Scholes

Appendix C: Quantitative Survey Distributed to IP attorneys

Survey One:



Survey Two:


Most important factor for decision

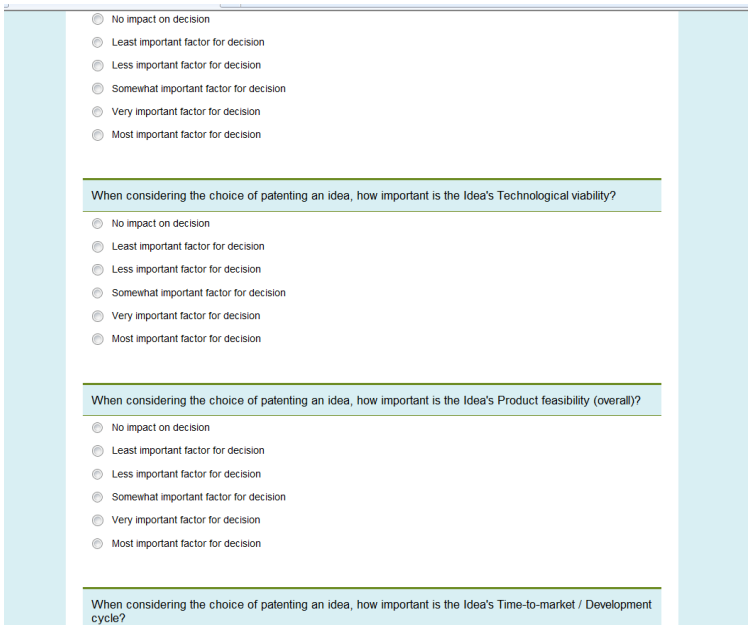
When considering the choice of patenting an idea, how important is the Idea's Novelty / Originality?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision

When considering the choice of patenting an idea, how important is Idea Quality / Completeness?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision

When considering the choice of patenting an idea, how important is the Idea's Alignment with company IP strategy – offensive/defensive?


No impact on decision

Least important factor for decision

Less important factor for decision

Somewhat important factor for decision

Very important factor for decision

Most important factor for decision

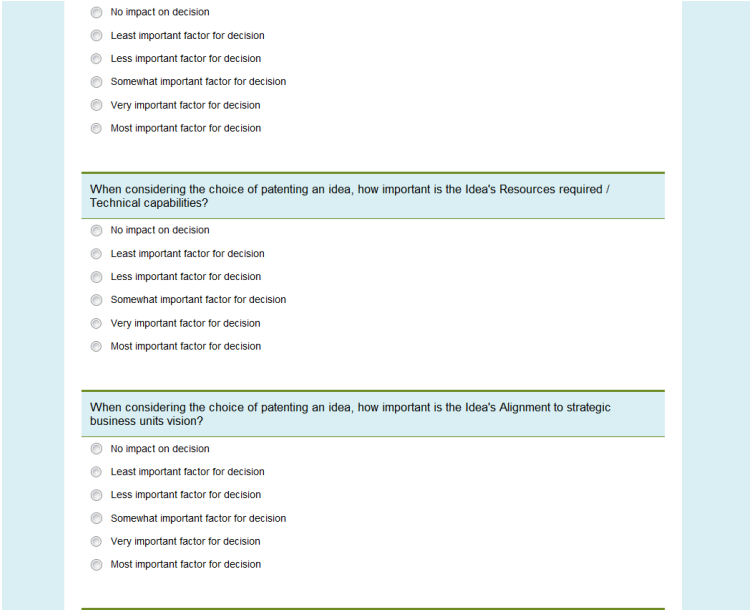
When considering the choice of patenting an idea, how important is the Idea's Technological viability?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision

When considering the choice of patenting an idea, how important is the Idea's Product feasibility (overall)?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision

When considering the choice of patenting an idea, how important is the Idea's Time-to-market / Development cycle?


No impact on decision

Least important factor for decision

Less important factor for decision

Somewhat important factor for decision

Very important factor for decision

Most important factor for decision

When considering the choice of patenting an idea, how important is the Idea's Resources required / Technical capabilities?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision

When considering the choice of patenting an idea, how important is the Idea's Alignment to strategic business units vision?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision

When considering the choice of patenting an idea, how important is the Idea's fit to current business model?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision

When considering the choice of patenting an idea, how important is the Idea's Alignment to the Company strategy?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision

When considering the choice of patenting an idea, how important is the creativity of the Idea?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision

When considering the choice of patenting an idea, how important is the Market acceptability?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision

When considering the choice of patenting an idea, how important is an understanding of the Target market?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision

When considering the choice of patenting an idea, how important is the Lifespan of patent?

- No impact on decision
- Least important factor for decision
- Less important factor for decision
- Somewhat important factor for decision
- Very important factor for decision
- Most important factor for decision